MENT OF [illegible]INOLOG
D ERIE COUNTY PUBLIC LIBRA

AUGUST 31, 1957
VOL. 153 — NO. 9

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY

MEXICO EXPANDS

Telefonos de Mexico's operating room in Mexico City. Toll calls in the city have increased 70 per cent in recent years. For article reporting observations of American telephone woman in Mexico, see story on page 22.

Published every week on Saturday by TELEPHONY PUBLISHING CORP. and 6 numbers thru Chicago 5, Ill. Subscription $4.00 per year. Entered as second class matter at the Post Office at Chicago, Ill., under the Act of March 3, 1879.

Guaranteed Circulation This Issue
12,080 of Which 11,519 Is Paid

ELECTRONICS SECTION — Page 25

MANAGEMENT • PLANT • TRAFFIC • COMMERCIAL • LEGAL • ACCOUNTING

FREES BUSY HANDS..
HUBBARD 2-2200
HANDS-FREE
TELEPHONE BY
STROMBERG-CARLSON

and gives many special benefits too!

When you offer your subscribers this instrument, you're offering *much more* than a device to provide telephone conversation without the need to hold a handset.

Here are some reasons why this telephone is superior to others on the market:

- ★ Takes less than 15 minutes to install.
- ★ Gives the user privacy.
- ★ Microphone is separate and non-directional.
- ★ Works "back-to-back."

You'll welcome the ease of installation and minimum service requirements of the Stromberg-Carlson Hands-Free Telephone. Your subscribers will enjoy its versatility, efficiency and handsome apppearance.

All your subscribers are potential users of this telephone: businessmen, professional people—even housewives. That's why it's such a vital source of increased income for your company.

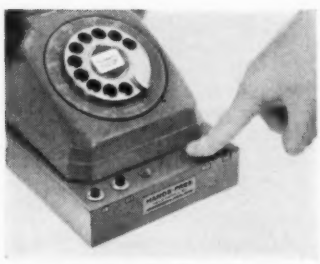
The Stromberg-Carlson representative in your area will gladly furnish sales literature and demonstration instruments. Write or call him today.

STROMBERG-CARLSON

A DIVISION OF GENERAL DYNAMICS CORPORATION

Sales Offices: Atlanta 6, Chicago 6, Kansas City 8, Rochester 3, San Francisco

INSTALL IT IN 14¾ MINUTES • Simply connect the line cord, plug in to a 110-volt AC outlet and attach the microphone cord. (Installation of some makes takes 3 to 4 hours.)



IT GIVES PRIVACY • If the user doesn't want the called party to hear the conversation around him, he simply presses and holds the microphone cut-off button. To resume Hands-Free operation, he releases the button.

THE MIKE IS SEPARATE AND NON-DIRECTIONAL • No need to move a bulky instrument around in group use. And the mike works from side, rear and front. The 12-foot cord permits placement wherever convenient.

WORKS "BACK-TO-BACK" • Doesn't interfere with other telephones. It works perfectly with any other instrument—including other Hands-Free Telephones.

XUM

FLASHES AND PLUGS

TELEPHONE POTPOURRI. From Rockford, Ill., emanates the story of a "potluck" telephone call which has become the summertime rage with all the Rockford Teen-agers. It's economical, it's novel, and for making new friends, they say it can't be beat. Here's how it works:

A typical teen-ager, age about 16, dials his own telephone number. This gives him the busy signal, but in between bleeps he hears the voices of dozens of teen-agers who have done exactly the same thing.

After a short interval to accustom the ear to the babble of voices heard as a background to the busy signal the teen-ager says "Hello" into the telephone in a louder-than-normal voice.

Generally, he can hear and be heard by one of the several dozen anonymous voices on the line better than the rest.

Having struck up a conversation with a kindred spirit, generally a girl, he then asks her name and telephone number, which are chanted between busy bleeps. Both then hang up, and the first teen-ager calls the number he extricated from the electronic mishmash of voices.

•

AVOID THE FUSS: TELEPHONE. From San Gabriel, Cal., came a release which stated that what this country needs is not, as Vice President Thomas Marshall said, a good five-cent cigar, but rather an eraser key on the typewriter—in the opinion of George Alton, the man who has just given up trying to invent it.

Alton, national sales administrator for Clary Corp., manufacturer of business machines, says modern science has solved practically everything except the costliest mistake in American business, the time lost in erasing mistakes on the typewriter.

Alton's almost perfect eraser key, the one he has just given up trying to finish, contained a special chemical that erased mistakes perfectly but had this one defect:

By the time the letter reached the addressee the acid left on the paper had eaten a million small holes in the correspondence.

•

INTERIM. "Snapping to" when the telephone rings at 4:15 a.m., a feat difficult at best, was neatly accomplished by a Billings, Mont., librarian recently, reports the United Press.

When the telephone trilled at daybreak one Sunday morning, a man's voice asked: "Who was the man in Josephine's life? You know—the one who marched away to Russia?"

"Napoleon Bonaparte," she answered, and went back to sleep.

CHANGE OF ADDRESS

Please notify your local postmaster and the Circulation Dept. of TELEPHONY of change of address. Change cannot be made without the old as well as the new address. Allow three weeks for change of address to become effective.

Telephony

THE JOURNAL OF THE TELEPHONE INDUSTRY
Since 1901

August 31, 1957

CONTENTS

IN THE NATION'S CAPITAL 17
By Francis X. Welch

TROUBLE CLEARING—THE NIGHT ALARM CIRCUIT (Section II)—Part 58 20
By L. N. Martin

MARCH OF MEXICAN TELEPHONY—JUNGLE DRUMS TO SOLAR RAYS 22
By Thelma Nance

TODAY'S HIGHLIGHTS OF FINANCE, TAXES, BUSINESS TRENDS 23
By Willard F. Stanley

TELEPHONY'S ELECTRONICS SECTION 25
By Harold B. McKay

THE PLANT MAN'S NOTEBOOK 31
By Ray Blain

PLANT MAN'S QUIZ 34
By Ray Blain

SQUARE WAVE TESTING—Part 3 35
By Harold B. McKay

COURTS AND COMMISSIONS 38

THE OPERATOR'S CORNER 40
By Mayme Workman

H. D. FARGO JR., *President and Director of Advertising* • A. J. STULTS, *Vice President and Advertising Manager* • R. C. RENO, *Vice President and Editor* • DAN S. FARGO, *Vice President and Managing Editor* • FRANCES E. CRETCHER, *Associate Editor* • FRANCIS X. WELCH, *Washington Editor* • RAY BLAIN, *Technical Editorial Director* • HAROLD B. McKAY, *Electronics Editor* • MAYME WORKMAN, *Traffic Editor* • VIVIAN RYDEN, *Circulation Manager.*

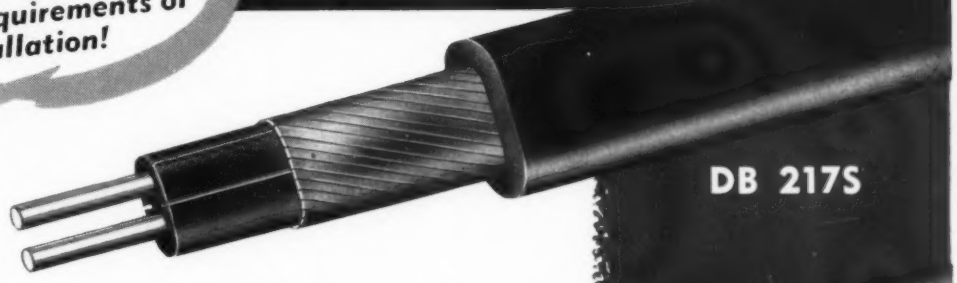
WESTERN REPRESENTATIVES: McDonald-Thompson, San Francisco, Cal. Also offices in Los Angeles, Seattle, Houston, Tex.; Tulsa, Okla., and Denver, Colo.

TELEPHONY PUBLISHING CORPORATION, 608 South Dearborn St., Chicago 5, Ill. 25c per copy (except special issues—40c). Subscription $4.00, 1-year; $6.50, 2-years; $8.50, 3-years. Add $1.00 per year for postage to Canada and Pan American countries; $2.00 per year to Foreign countries. Telephone WAbash 2-2435.

XUM

OF THESE 3 TYPES OF
SUPERIOR
DIRECT BURIAL WIRE
...one will "do the trick" for you!

Buy SUPERIOR DIRECT BURIAL WIRE to match the requirements of your installation!



DB 217S

1 Need wire having maximum resistance to damage from road or farm machinery and implements . . . or other similar sources?

Order the SUPERIOR DB No. 217S with spiraled flat steel strip shield and green jacket.

DB 217B

2 Need wire to resist damage from insects and rodents . . . or peculiar soil conditions which are conducive to increased lightning activity?

Order SUPERIOR DB No. 217B with longitudinal bronze shield and yellow jacket.

DB 217

3 Need wire for direct burial installations in areas where conditions are normal and no specific hazards are likely?

Order SUPERIOR DB No. 217 non-armored type with red jacket.

All three types provide excellent electrical and physical characteristics. High tensile strength 17 gauge copper conductors are insulated with polyethylene. Tracer ridge on the core runs the length of the wire. The high grade polyvinyl chloride jackets offers great resistance to water, oils, alkalis and earth acids. Also supplied in 16 gauge copper conductors on request.

INDEPENDENT

Order SUPERIOR Direct Burial Wire NOW or write for complete in

SUPERIOR CA

SUPERIOR CABLE CORPORATION • Hickory, North Carolina

if you want dial . . .

it's **KELLOGG** for

THE MOST COMPLETE L

CROSSBAR

Crossbar switching allows you maximum expansion . . . requires practically no routine maintenance . . . gives you high traffic capacity . . . has convenient drawer mounted switches which are easily accessible . . . allows PBX grouping service . . . is adaptable to inter-toll dialing.

NEW ADDRESS!
Kellogg Sales Offices have moved to:
6650 S. Cicero Ave., Chicago 38, Ill.
The new phone number is: POrtsmouth 7-6900.

STEP-BY-STEP

Step - by - Step switching gives you long life and low cost operation . . . is expandable for increased station and traffic requirements, allows trunking flexibility . . . is easy to check and adjust (each switch is a separate unit) . . . is compact and space-saving.

RELAYMATIC

Relaymatic all-relay switching is simple to install and easy to maintain . . . . operates with any type of trunk line . . . allows you up to 10 party selective divided ringing . . . has adaptors available for grounded rural lines.

XUM

TE LINE IN THE WORLD !

Your Kellogg representative is well qualified to help you choose the dial system that best fits your needs . . . only Kellogg offers a complete line of dial equipment to the independent telephone company.

For more detailed information on any of these systems ask your Kellogg representative.

7-A2 ROTARY

Rotary switching gives you the advantages of motor driven, register-type system . . . allows large trunk groups and is adaptable to inter-toll dialing.

PABX'S

For PABX's you have your choice of several types of switching: cross-bar . . . step-by-step . . . or relaymatic . . . in all sizes.

KELLOGG

A DIVISION OF I T & T

KELLOGG SWITCHBOARD AND SUPPLY COMPANY

A Division of International Telephone and Telegraph Corporation

Sales Office: 6650 S. Cicero Ave., Chicago 38, Ill.
PHONE: POrtsmouth 7-6900

KELLOGG Branch Warehouses and Offices:

6000 W. 51st Street
Chicago 38, Illinois
REliance 5-5445

4501 Truman Road
Kansas City 1, Missouri
Humboldt 7085

410 N. Syndicate Avenue
St. Paul 4, Minnesota
Nestor 5878

504 County Bank and Trust Bldg.
Passaic, New Jersey, Prescott 9-3610

1515 Turtle Creek Blvd.
Dallas 7, Texas
Riverside 7-5191

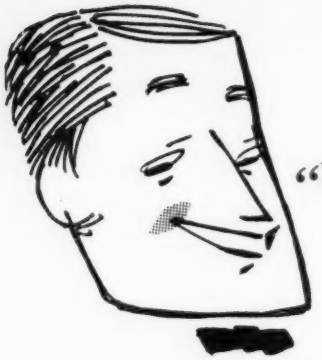
23 Broderick Road
Burlingame, California
OXford 7-5780

1555 West Fourth Street
Mansfield, Ohio
Mansfield 7-2816

1594 Southland Circle, N.W.
Atlanta, Georgia
Sycamore 4-2441

Export Distributor:
International Standard Electric Corp.
50 Church Street
New York 7, New York

XUM



"Why, it's no bigger than a regular telephone!"

"It's so smart-looking, too!"

(NATURALLY, THEY MEAN AUTOMATIC'S LOUD-SPEAKING TELEPHONE)

Here's something worth remembering about Automatic's Loud-Speaking Telephone. *It's the same size and shape as our Type 80 Telephone.* No excess bulk—just a standard-size telephone and compact speaker (the control unit mounts under the desk, out of sight, and out of harm's way).

The tiny microphone is in the base of the telephone and is non-directional, so you can talk in a normal voice from any direction. That means that Automatic's Loud-Speaking Telephone can be used by a number of people in a conference, without the annoyance of handing a microphone around!

Automatic's Loud-Speaking Telephone quickly turns prospects into customers. And it's easy to install by following the simple directions supplied. To find out more, write for Circular 1857. Address: *Automatic Electric Sales Corporation, Northlake, Illinois. Or call FIllmore 5-7111.*

AUTOMATIC ELECTRIC

A member of the General Telephone System—
One of America's great communications systems

GENERAL SYSTEM

XUM

New Catalog No. 451 Protector

Whether the need for a single pair lightning and static drainage unit is scattered or highly localized is best known to the folks who operate the telephone plant.

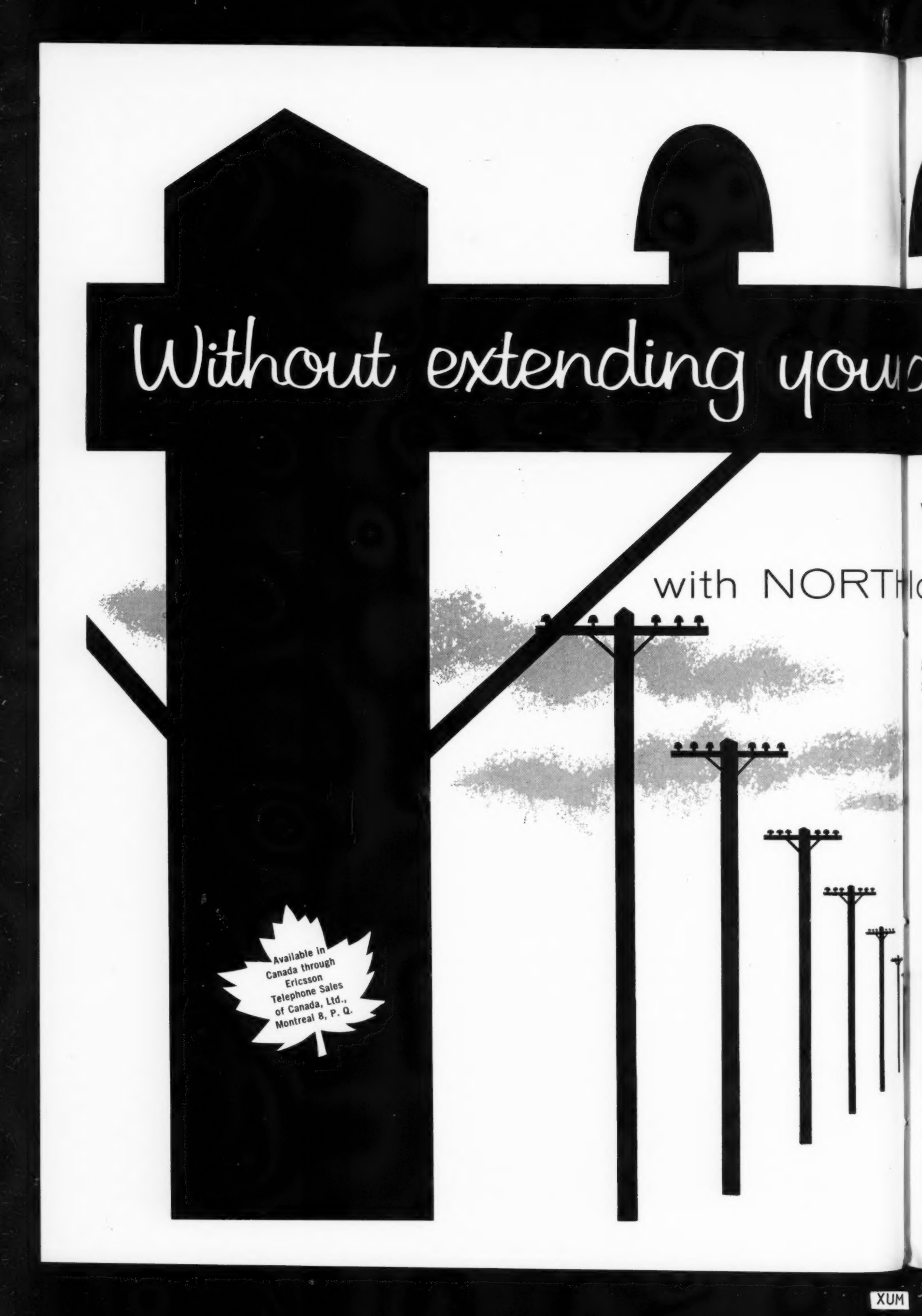
The term "buffer" has been used to describe such a protective unit and the term seems to be well suited to Reliable's new Catalog Number 451. Its function is to drain lightning and static discharges from open wires that are connected to cable and reduce the voltage at the cable junction.

The new unit protects protected cable terminals and will perform in front of unprotected terminals. It is also protection for loud speakers, coils, filters and such.

Here again Reliable engineers have studied both cause and effect and have designed a protector to take care of a problem that is recognized throughout the Communications Field.

Reliable

RELIABLE ELECTRIC CO. • CHICAGO


Without extending you
with NORTH
Available in
Canada through
Ericsson
Telephone Sales
of Canada, Ltd.,
Montreal 8, P. Q.

XUM

...physical lines...

you can extend your service

THlow cost SUBSCRIBER CARRIER

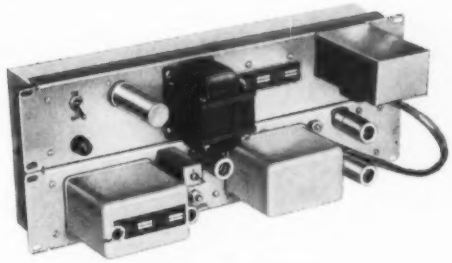
Service to the community has always been the keynote of the telephone industry. Yet today many Independent Companies, anxious to meet the ever increasing pressures for extended service, are faced with the problem of heavy expense incident to the construction of physical lines.

North Low Cost Subscriber Carrier has been specifically engineered and built to overcome this obstacle.

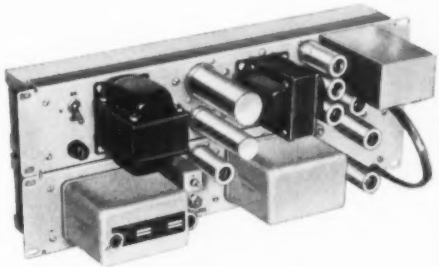
With North Subscriber Carrier you can:

Provide service for waiting list customers adjacent to lines now filled to capacity; reach potential customers beyond the end of present lines; provide private, two-party, or four-party lines not now available, with improved rate earnings; free physical circuits for pay stations and other special revenue services; meet demands for special temporary service, where carrier can be moved to meet changing requirements; and offer improved service to customers now on overcrowded lines!

Let your NORTH representative show you how NORTH Subscriber Carrier can do all this for you at a substantial saving over physical line construction.



CENTRAL OFFICE TERMINAL



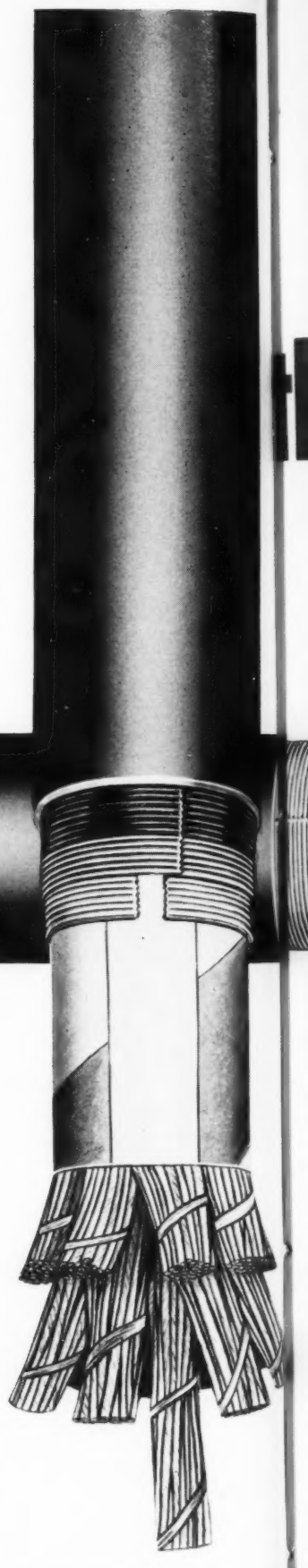
DISTANT TERMINAL

NORTH ELECTRIC COMPANY

601 SOUTH MARKET STREET • GALION, OHIO

XUM

from LEICH...



Now — Leich offers you Alpeth and Stalpeth Sheathed Cable — General Cable's two new types of sheaths. Here you have two types of telephone cable with all the protective qualities you need, without all the excessive weight.

Installation is more economical with these new developments. For example, in aerial installations, there is a reduction in messenger strand size and pole supports, or an increase in span lengths. With these lighter weight sheaths, pulling in underground systems is easier and less expensive.

Like all General Cable products, the moisture-and-corrosion resistant outside cover will guarantee you years of dependable service.

Whatever your cable needs may be, you can get the full story of Alpeth and Stalpeth sheaths from your Leich representative.

*Manufactured and sold under patent license agreement with the Western Electric Company.

LEICH

A MEMBER OF THE GENERAL TELEPHONE SYSTEM — ONE OF AMERICA'S GREAT COMMUNICATIONS SYSTEMS

the best in telephone cable

★ lightweight
★ handles easily
★ installs rapidly
★ superior performance
★ greater economy

Alpeth *

ALPETH

Alpeth is ideally suited for polyethylene insulated telephone cable. It consists of a combination of 2 components: a low-resistance aluminum tape shield applied longitudinally over the cable core; and an extruded, high molecular weight, moisture- and weather-resistant polyethylene jacket. Alpeth has full color coding. Available in conductor sizes, 26 AWG, 24 AWG, 22 AWG and 19 AWG in cables ranging from 6 to 404 pairs. Send your inquiries for prices and deliveries now!

Stalpeth *

STALPETH

Stalpeth offers a superior degree of protection against diffusion of moisture and is better suited for protection of paper insulated telephone cable. Stalpeth consists of 3 components: first, a corrugated aluminum shield tape is applied longitudinally over the cable core; secondly, a corrugated, coated steel tape is applied longitudinally with the overlap seam soldered; and finally, an extruded, high molecular weight, moisture- and weather-resistant polyethylene jacket is plastic cemented to the steel tape. Available in sizes 26 AWG, 24 AWG, 22 AWG, and 19 AWG in cables ranging from 16 to 2121 pairs. Send your inquiries for prices and deliveries now!

LEICH SALES CORPORATION, 427 WEST RANDOLPH STREET, CHICAGO 6, ILLINOIS

PACIFIC COAST: 11401 WEST PICO BLVD., LOS ANGELES 64, CALIFORNIA SOUTHWEST: 1227 SLOCUM STREET, DALLAS 7, TEXAS

INDEPENDENT

manufacturers of telephones, switchboards and related apparatus since 1907

60 years of service

Born in 1897 . . . the United States Independent Telephone Association is growing bigger and stronger every year.

Today, with 4300 telephone companies serving over 9,000,000 subscribers in two-thirds of the geographical area of the nation, The Independent Telephone Industry has a $2.5 billion investment that helps you reach all America.

Steadily extending its far-flung telephone network . . . developing new communications devices and techniques . . . Independent Telephone Companies grow with the ever-expanding needs of the nation.

THE American telephone industry is composed of the Bell System and the Independent companies. Bell operates essentially in the big metropolitan areas, the Independents serve mainly in the smaller towns, fast-growing suburbs, rural regions. Together, they form the world's greatest communications network.

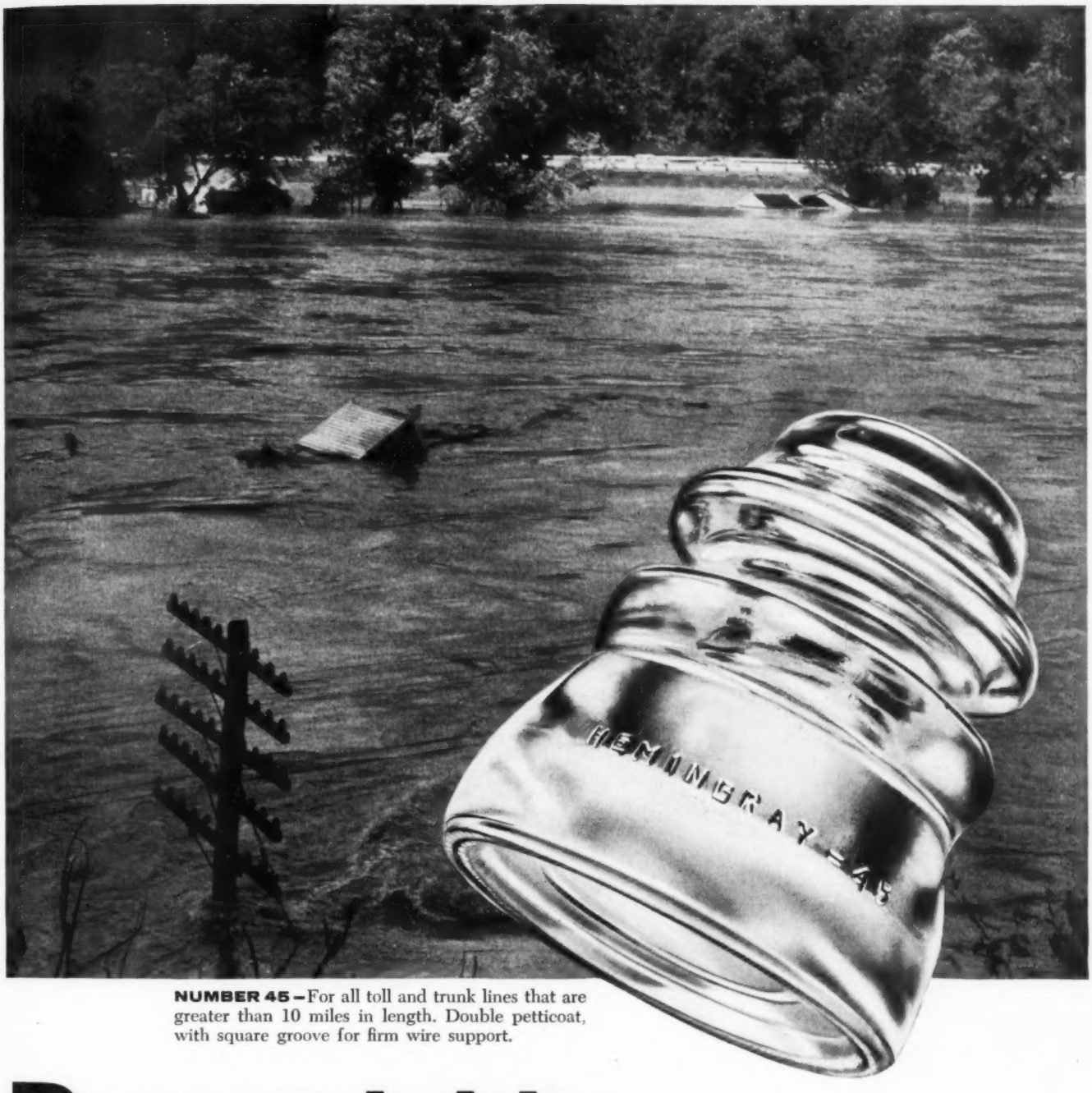
September 8-14 is Independent Telephone Week in 11,000 U. S. Communities

GENERAL SYSTEM

GENERAL TELEPHONE SYSTEM

ONE OF AMERICA'S GREAT COMMUNICATIONS SYSTEMS • 260 MADISON AVENUE, NEW YORK N. Y.

XUM



NUMBER 45—For all toll and trunk lines that are greater than 10 miles in length. Double petticoat, with square groove for firm wire support.

Dependable ...in emergencies

You have to depend on your equipment when rampaging nature puts communications systems to their severest tests.

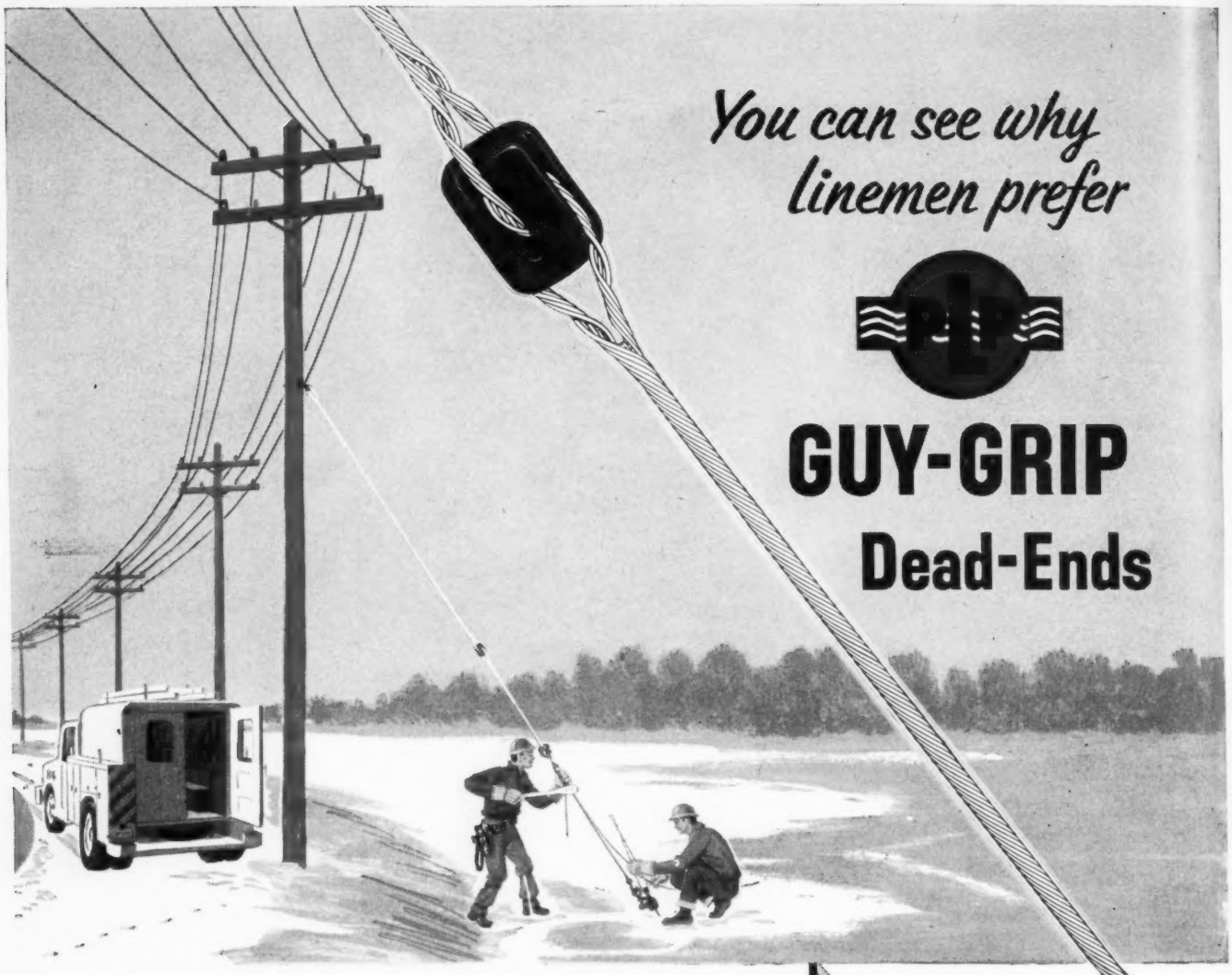
You *can* depend on Hemingray Glass insulators to stand up under severe conditions and provide the service you need. Strong, uniform high quality Hemingray insulators since 1870 have been the world standard for quality . . . have carried most of the world's overhead telephone and telegraph wires.

Hemingray has pioneered many insulator developments, to keep pace with the requirements of improving communications systems. For prompt delivery of what you need . . . when you need it, you can always depend on Hemingray.

Hemingray Glass insulators are a product of Kimble Glass Company, subsidiary of Owens-Illinois, Toledo 1, Ohio.

HEMINGRAY INSULATORS
AN (I) PRODUCT

OWENS-ILLINOIS
GENERAL OFFICES · TOLEDO 1, OHIO



You can see why linemen prefer

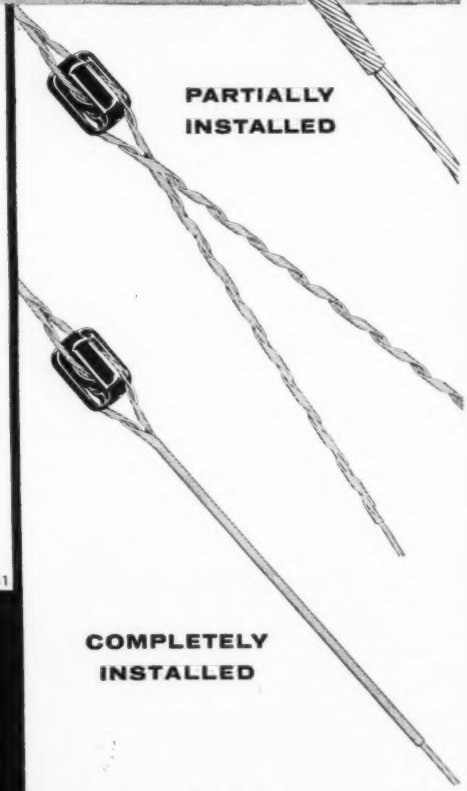
GUY-GRIP Dead-Ends

Linemen are enthusiastic!

PLP GUY-GRIP dead-ends are the easiest, fastest and safest method yet devised for dead-ending strand.

Installation is easy because it takes just one unit, no moveable parts, no bolts or clamps to tighten. It's fast. All you do is hand-wrap the dead-end legs around the strand.

And it's safe. You can see at a glance that the installation is completed and thus secure. Linemen make better time, take pride in their work.
Dept. No. TR2B



PX-81

PREFORMED LINE PRODUCTS CO.
CLEVELAND 3, OHIO

Made in accordance with or for use under U. S. Patent No. 2,761,273; other patents issued and pending.

XUM

IN THE NATION'S CAPITAL

BY FRANCIS X. WELCH, WASHINGTON EDITOR

Rumor has it that REA Administrator Hamil may resign over "stripping of authority." Southern Bell "goes to the people" after Louisiana commission and courts deny rate increase. Study shows overzealous regulation can be self-defeating.

APPARENTLY, all is not sweetness and light around REA headquarters these days. Officially denied by Secretary of Agriculture Benson, but still going around the Washington grapevine, is the suggestion that REA Administrator Hamil may take his leave one of these days. At this writing there has been no word out of Hamil directly on this. The present REA difficulty has more to do with rural electrification loan policy than rural telephone loans. It concerns a recent order stripping Hamil of authority to make the final say on loans in excess of $500,000.

Returning from a recent trip Benson confirmed a report that loans in excess of a half-million dollars must now clear through Kenneth L. Scott, director of Agricultural Credit Services. Benson explained this transfer of authority from REA Administrator Hamil as routine internal departmental shift under an Agriculture Department Reorganization Plan adopted by the 83d Congress (1953). It is understood that Benson has obtained an attorney general's opinion backing up the change.

Benson said that Hamil had been informed "orally" of the change, and that the new system was "working out very well." He explained that the purpose was to achieve full co-ordination of all REA activities." He also referred to a "tight budget situation," a greater request for REA loans, and the problem created by the continued low interest rate on REA loans in view of the mounting cost of money to the treasury (now 4 per cent) to finance such loans.

Benson brushed off the suggestion that Hamil would resign or was unhappy about the change. He said no one had suggested to him that Hamil might resign and that he regarded Hamil as a good administrator. He pointed out that under the redelegation of departmental authority since the 1953 legislation, the director of agricultural Credit Services (Scott) was actually the supervisor of REA. Rumors persist, however, that Hamil will leave sooner or later.

Virtually all generation and transmission loans (super co-ops) for rural electrification would fall under the shift of authority for approving loans in excess of $500,000. All such loans are now channeled to the former Montana representative, Wesley D'Ewart, now assistant director of Agricultural Credit Services. D'Ewart reviews the loans and, if he finds them acceptable, they are returned for Administrator Hamil's approving signature.

There is some reason to believe that the administration, concerned over increasing REA loans for super co-ops for large amounts, and in view of the administration's inability, so far, to get Congress to raise the statutory 2 per cent interest rate, will insist on more careful scrutiny of loans in this category. Senator Morton (R., Ky.), defending the policy against an attack on Benson by Senator Humphrey (D., Minn.), says such a procedure is necessary so that loans do not unknowingly push the government beyond its statutory debt limit.

Appeal to the People

Southern Bell Telephone & Telegraph Co. has been having bad luck in its effort to secure increased rates in the state of Louisiana. Difficulties in rate cases in a number of states are occurring these days, in view of the natural resistance of the regulatory commissions to add increased rates for telephone service to the burden of their state citizens already coping with the high cost of living. The difficulties of the telephone industry seem to stem from the impression, in some quarters, that because prices for everything else have more than doubled since Pearl Harbor (including the price which telephone companies must pay for labor, equipment, plant construction, etc.) telephone companies should not be given rate increases which generally lie in the order of 25 per cent more than the pre-war level.

But the situation in Louisiana is an exceptional one in many ways. It is the only rate case in recent years, in any state, where a company's effort to secure an increased rate resulted in an actual reduction of the rate. It is the only case where the telephone company's rate was actually cut below the amount which the company now has to pay to borrow money for new construction. There were a number of other frustrating features contained in the Louisiana commission's decision which have already been commented upon in this department.

But the most difficult aspect of all, in the Louisiana case, is the fact that the company is at the end of its rope in seeking regulatory relief. It has exhausted all remedies allowed by regulatory procedure (with the possible

exception of a pending application for an "emergency" rate increase which was recently made to the commission).

Generally, in difficult situations such as this, a telephone company can look for some relief from the appellate courts. But the highest court of the state—the Louisiana Supreme Court—has already spoken and affirmed the commission's rulings in every major holding (18 PUR 3d 329). Justices of the Louisiana Supreme Court, just like the members of the Louisiana Public Service Commission, are elected by the people. They are not appointed by the governor.

So, there would seem to be no other place for the company to go now except to the people. And that is just what the Southern Bell Telephone & Telegraph Co. has done, in a very interesting development which will be watched with interest by telephone companies (as well as other public utilities) in other parts of the country. In seeking public support, the Bell company has placed display advertisements in leading Louisiana newspapers. It claims that it is in "critical financial trouble in our state" and that its Louisiana earnings have been cut to a point even below the interest rate the company has to pay for borrowed money. The advertisement, which is in the form of an open letter from Homer G. Bartee, vice president and general manager, states:

"As an example, you may have seen recently where the company borrowed 70 million dollars as a part of its program to build more facilities to meet the demand for service. We have to pay $4.91 a year interest for each $100 we borrowed. Now, if we use that $100 to build facilities to serve you or your neighbor in Louisiana, we earn only about $4.24 a year on it under our present rate structure.

"While some of our expansion money is raised by borrowing, a great deal must be raised from the sale of stock. This costs even more. Of course, no business can afford to expand its equipment and service when the expansion money costs more than can be earned on it. That's why further telephone progress and development are seriously threatened."

This letter goes on to point out that more than 14,000 applications for new and improved service come in monthly, because of expanding business and farm operations. The letter states that "because our earnings have been cut so low we will not be able to fill all these orders." The company's appeal stressed its devotion to the growth and progress of the state and its obligation to serve the people of the state. This was the first of a series of "open letters" promised by the company's general manager on the subject.

REA Approves Loans in Four States

The Rural Electrification Administration made loans the week of Aug. 11 in Georgia, Idaho, New Hampshire and Virginia, the U. S. Department of Agriculture announced on Aug. 12. The loans, totaling $1,287,000, will be used by the borrowers to bring new and improved telephone service to 2,711 subscribers in rural sections of the four states.

Citizens Telephone Co., Inc., Leslie, Ga.; $310,000, first loan (Aug. 14).

The Citizens Telephone Co., Inc., merging the Leslie-Desoto Telephone Co. at Leslie, Ga., and the Citizens Telephone Co. at Plains, Ga., was incorporated June 19.

The loan funds will provide modern automatic service for 337 rural subscribers, now without telephones, and improved service for 395 present subscribers. The present system has two unattended central automatic offices at Leslie and Plains.

Loan funds also will finance construction of a new commercial and central automatic office building at Leslie and new central automatic exchange buildings at Plains and Lake Blackshear. The borrower proposes to transfer the automatic switchboard now in the Leslie exchange to the planned Lake Blackshear exchange. New automatic facilities will be installed in the Leslie and Plains exchanges. A portion of the loan will refinance the borrower's current indebtedness.

Tommy C. Smith is president of the Citizens Telephone Co., Inc.

•

Aberdeen (Idaho) Telephone Co., $62,000, third loan (Aug. 14).

The borrower plans to use these funds to service 169 rural subscribers not previously provided for.

Funds are also provided to complete the system as originally authorized.

The three REA loans, totalling $361,000, will enable the Aberdeen company to provide dial service to 964 rural subscribers. The system will provide exchanges at Aberdeen and Springfield.

S. Festus Monsen is president and manager of Aberdeen Telephone Co.

•

Citizens Telephone Cooperative (formerly the Citizens Mutual Telephone Co., Floyd, Va.; $600,000, second loan (Aug. 15).

The borrower plans to use these funds to improve service for 772 existing subscribers and to furnish initial service to 481 farm families.

As a nucleus for the new service, the cooperative proposes to acquire the following telephone properties: West Fork Telephone Co., Willis; Ballard Telephone Co., R. F. D. No. 3, Willis, and the Locust Grove Mutual Telephone Co., Check.

New facilities scheduled include automatic central offices at Ballard, Check and Willis.

The two REA loans, totaling $1,063,000, will make possible new and improved service to 2,167 subscribers. The system will have five exchanges, of which Floyd and Alum Ridge are now in operation.

John T. Harmon is president and William R. Dunn is manager.

•

Chester Telephone Co., Manchester, N. H.; $315,000, second loan (Aug. 16).

The borrower plans to use these funds to extend its service area to provide new and improved service to 551 rural subscribers, including 187 farm families now with no telephones. To do this, the Chester company proposes to acquire the facilities of the Weare Telephone Co. which now provides magneto service to 364 subscribers.

New construction planned by the borrower includes an automatic central office in Weare. The two REA loans, totaling $535,000, will make it possible for the borrower to furnish new and improved service to 1,002 rural subscribers. The completed system will provide automatic exchanges at Chester and Weare. John S. Rand is president.

XUM

The letter signed by Bartee concludes with his personal conviction that ". . . when you (the Louisiana people) know the facts, you will want Southern Bell to have rates that will enable us to do the kind of job expected of us."

What are the chances of success in a mass appeal of this kind to the public sense of fair play and square deal? The answer will have to await the result. To this writer's knowledge such a direct appeal to the public has not been tried before, on such a scale by any regulated public utility under similar circumstances.

Southern Bell's appeal certainly has a force of logic behind it. When the people of Louisiana see that the company is no longer able to meet all the demands for service that are being made upon it because of subnormal earnings; and when, as a result, the expansion and progress of the state, compared with such a progressive neighboring state as Florida, is seriously threatened, the sentiment in the bayou country may change. When a big industry (certainly telephone business is big industry everywhere) has to cut down construction, cut back expansion, and the number of job opportunities, and shift such operations to other states, it is in the best self-interest of the local citizenry to make corrections. If public sentiment does change along this line in Louisiana, political ears are usually quite keen and alert.

Even so, such changes take time, and it does not follow that results will come in Louisiana in a hurry. Right now, the company is in the process of refunding millions of dollars. The Louisiana subscribers are probably getting a big kick out of actually getting money back from the telephone company instead of paying the service. It takes a lot of selling to overcome that kind of counter propaganda. Maybe these open letters will do the trick. It is difficult to see at this point what else Southern Bell could have done under the circumstances. Up to now it has certainly been taken for a Louisiana hayride.

Incidentally, the following passage from a recent address (Aug. 6) by one of the Louisiana commissioners, John J. McKeithen, before 3,000 members of an REA co-op meeting at Winnsboro, La., is an example of what the high-priced, striped-pants lawyers would call *"res ipse loquitur"*—the thing speaks for itself!

"Ladies and gentleman, I'm going to work just as hard as I can to see that just as many of you as can, can get telephones for just as cheap a price as you can. Now, you know, some people take different views about the duties of the public service commission. They say that we're supposed to balance the equities. We're supposed to see that the company gets a square deal and we're supposed to see that the consumer gets a square deal. That's true. But think of this a minute. It so happens that the telephone company, the Southern Bell, is a part of the largest corporation in the world, and they've got money. You have often heard the expression 'Money can't speak, but it will sure talk.' All right! This largest corporation in the world has got money to go hire the finest lawyers in the world. They've got money to go hire the finest witnesses in the world. They've got money to do anything that money can do to help them. Who have you got to help you when it comes to a rate case? You haven't got anybody to stand between you and higher rates but a public service commissioner like me. Now, I look at that thing as pretty much unbalanced. They've got all the money, they've got all the experts. You don't have any money. You don't know anything about the rate case. So, I say to you, my friends, it is more the public service commission's duty to protect the public interest than it is to protect the company's interest, because you can rest assured that the company is going to see that their interests are protected."

Strict Versus Liberal Regulation

It is coming to be a recognized fact that overzealous regulation can actually be self-defeating. Public utilities

(Please turn to page 43)

TWO STATES WITH STRINGENT REGULATION

State	Company	8/19/57 Price	Share Earns.	Price-Earn. Ratio	Earn. Price Ratio	1956 Return on Investment
New York	Consolidated Edison	42	$3.00*	14.0	7.1%	5.0%
	Long Island Lighting	21	1.43	14.7	6.8	5.4
	N. Y. State Elec. & Gas	34	2.80*	12.1	8.3	5.8
	Rochester G. & E.	26½	2.27	11.7	8.5	5.4
	Central Hudson G. & E.	15½	1.00	15.5	6.5	5.6
	Average			13.6	7.4%	5.4%
California	Pacific G. & E.	46½	3.32	14.0	7.1%	5.5%
	So. Cal. Edison	46½	3.12	14.9	6.7	5.4
	San Diego G. & E.	18	1.41	12.8	7.8	5.8
	Calif. E. P.	13½	.96	14.1	7.1	5.6
	Average			14.0	7.2%	5.6%
	TWO STATES WITH MORE LIBERAL REGULATION					
Florida	Florida Power & Light	46	2.80	16.4	6.1%	7.0%**
	Florida Power Corp.	52	2.66	19.5	5.1	6.4
	Tampa Electric	31½	1.71	18.4	5.4	6.7
	Average			18.1	5.5%	6.8%
Texas†	Houston Lighting	54	2.58	20.9	4.8%	8.6%
	Texas Utilities	42½	2.44	17.4	5.7	8.1
	Average			19.1	5.3%	8.4%

*Adjusted for deferred taxes.

**Approximate. A pending rate adjustment may reduce the return to 6½ per cent.

†Regulation only by municipalities (state law mentions 8 per cent as fair return).

TROUBLE CLEARING

The Night Alarm Circuit—Section II

By L. N. MARTIN

IN OUR preceding article, we undertook a discussion of the night alarm circuit but got no farther than the magneto board. We believe that the space devoted to the magneto board was justified because it is estimated that there are approximately 4500 magneto offices still in service and the night alarm is of special importance in these boards. In that article, we omitted one feature that is worthy of notice.

Some of the later magneto boards have two complete night alarm circuits: The regular (which we have described) and the "Code Alarm." The regular alarm rings when a call comes in and continues to ring until the call is answered. The code alarm sounds only while ringing current is coming in from the line, and hence it repeats the code ringing on a party line.

The idea is that the code alarm may be connected to a party line in place of the regular alarm so that the operator may listen to the code ring while lying in bed and she need not get up if the call is not for her. How is this accomplished?

The armature of a magneto drop is not polarized and, hence, it will respond to current in either direction. Therefore, a 20-cycle current will attract the armature 40 times per second. This does not give the armature time to recover between pulses and, while it buzzes or chatters, it remains very close to its fully operated position as long as the ring is coming in from the line. Now, if the armature is equipped with a contact spring which has a generous "follow-up," and this spring makes contact with a fixed contact point soon after the armature starts to move, the contact will remain closed during the ringing period and may be used to ring the code bell.

The code alarm has its own bell, battery, and cut-off key and is, therefore, quite independent of the other alarm. In those we have seen, the head of the contact adjustment screw extends through the face of the board so that the contact may be readily adjusted with a screwdriver; or by backing off this screw the code alarm may be disabled at any desired drop.

PART 58. The preceding article in this series appeared on page 22 of the July 20 issue.

Is the code alarm a good feature? If so, it does not seem to be appreciated. We have seen many boards with this feature and in no case has it been in use. We have often found that the bell had been "borrowed" for other uses and the battery was also missing.

If your board has this feature why not leave it connected so that you will have *two* night alarms? This would give you double assurance of receiving all night calls.

If your board does not have a code alarm and you have occasional use for such a circuit on some particular line that is having a spell of inter-party ringing at night, there is a simple solution. Fit an ordinary extension bell with a switchboard cord and plug and keep it where the night operator can find it. When the plug is inserted in a line jack it disables the drop and, hence, the night alarm on that line, and the operator can hear the code ringing on the extension bell.

The night alarm circuit of a common battery board is quite different from that used in a magneto board. Most common battery boards have a line relay for each line. When one of these relays is operated by an incoming call, its single contact places ground on the "lamp wire" associated with that line. A battery common is connected to the other terminal of all the line lamps. (In some boards, battery is connected at the relay and ground at the lamp.) The winding of the night alarm relay (N. A. Rel.) is connected in series with the battery supply to the lamps so that it operates when any lamp is lighted.

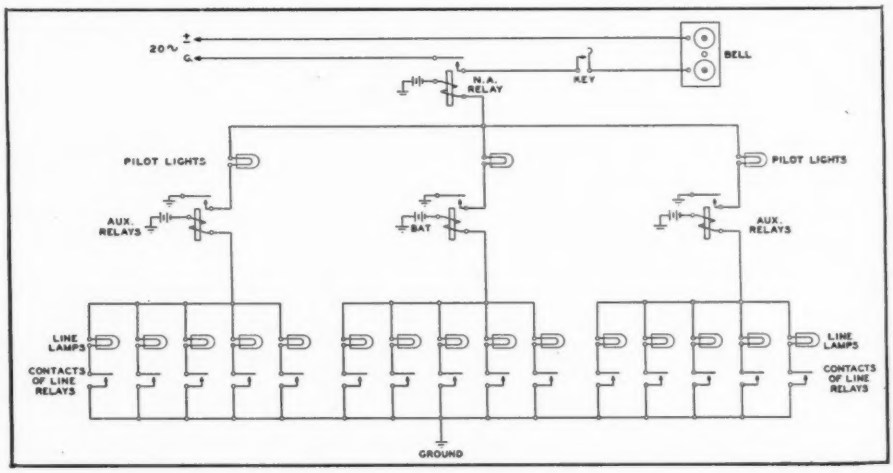


Fig. 1

In the larger boards there is a further complication. Each panel has a "Pilot Light" which lights whenever any line lamp in that panel comes in. In this case, the battery for all the line lamps in one panel is fed through the winding of an "Auxiliary Relay" which, in most boards, is the same type as that used for the night alarm relay. The contact of the auxiliary relay closes the pilot light circuit and the

battery for all of the pilot lights is supplied through the winding of the night alarm relay.

Fig. 1, which represents a typical night alarm and pilot light circuit, should help to clarify our description. It shows one night alarm circuit, three pilot light circuits, and five line light circuits in each of the three panels. In practice, there would, of course, be many more panels and many more lines in each panel.

The only part of the line relay shown is the contact, as this is the only part that is included in the circuit under discussion. When any one of the line relays is operated by an incoming call its single contact closes and places ground on the lamp wire. This closes a circuit from battery, through the winding of the auxiliary relay, the line lamp, the contact of the line relay to ground. This lights the line lamps and operates the auxiliary relay.

The operation of the auxiliary relay closes its contact which sets up a circuit from battery, through the winding of the night alarm relay, the pilot lamp, the contact of the auxiliary relay to ground. This lights the pilot lamp and operates the night alarm relay.

The operation of the night alarm relay closes its contact and rings the bell.

When the operator inserts a plug in the answering jack, the line relay releases. This retires the line lamp and the pilot lamp, releases the auxiliary and night alarm relays, and stops the bell.

In *Fig. 1*, we show an ac bell—an ordinary telephone bell. This is commonly used in large offices where continuous ringing current is always available. The advantage is that this bell has no contact and hence requires less maintenance. Also, it does not noise the board as a battery bell sometimes does. Where continuous ringing current is not available, a battery bell is used. Some PBX boards have a buzzer that may be changed from ac to dc by changing one connection.

In our drawing we show the N.A. key arranged to open the bell circuit when the night alarm is not wanted. In some boards, this key shortcircuits the winding of the N.A. Rel. The reason for this is that the heavy-day load may cause too much current to flow through it, which might increase its residual magnetism.

Fig. 1 shows a *typical* arrangement. There may be many variations from this in any particular board.

What maintenance problems are involved in this circuit? The night alarm or auxiliary relay operates in series with a lamp, or in series with two or more lamps in parallel. There is a voltage drop through the relay, therefore, the lamp does not receive the full battery voltage. Now, a lamp may be made for any desired voltage, but, in this case, the voltage varies with the number of lamps in the circuit. The formula for voltage drop is: $V = IR$, where V is the voltage drop, I is the current, and R is the resistance. If two or more lamps are lighted there is more current (I) and, hence, more voltage drop (V), and the voltage at the lamp will be less.

ALWAYS CALL BY NUMBER
MORRIE
"NOW ISN'T IT RIDICULOUS TO SHOW A TWENTY-MINUTE CALL TO THAT WESTMINSTER NUMBER. HOW COULD I TALK FOR TWENTY MINUTES?..I JUST CALLED MY SISTER TO SAY HELLO. WE HAD BEEN THERE THE DAY BEFORE SO THERE WAS NOTHING WE COULD TALK ABOUT,...WHY LET ME TELL YOU....."

If the relay had a resistance of say 40 or 50 ohms, two lamps would probably be dim and more than two, invisible. *For this reason the N.A. and Auxiliary relays must have a very low resistance, often less than 1 ohm.* With a low resistance relay the voltage drop is so small that it may be disregarded.

Low resistance means fewer turns of wire in the winding and a low magnetic pull. This does not mean that the relay will cause trouble, or that it will be hard to adjust, however, it must be carefully adjusted to the current flow requirements which are specified in the instructions for that board. The minimum current will be received when only one lamp is lighted and, as there are no variables in the circuit, it will never be less than that unless there is a case of trouble such as poor contact, a high resistance connection or a wrong type of lamp in use.

An office will frequently use several types of lamps in its various boards, perhaps two or more types in the same position. The line lamps and the cord lamps are often quite different. Now, all of these lamps look alike except for the type number which is usually stamped on the base of the lamp. Great care must be used in replacing a lamp to see that the correct type for that location is installed. In some cases, an incorrect type may seem to be satisfactory, but its resistance will affect the operation of a relay in series with it.

Since the operating circuit of the night alarm relay does not extend outside of the office, it is not subject to leakage. Therefore, "non-operate" and "release" values are not usually specified for this relay. If they are specified, it is to assure sufficient spring tension to overcome any possible residual magnetism.

Some of the older boards in service may be equipped with gravity type night alarm and auxiliary relays. Gravity is a force that cannot be adjusted as spring tension can be adjusted. Also, all of these relays were made many years ago and their cores are not made of modern magnetic alloys. The worst fault that we have found with most of these old relays is that they retain large and varying amounts of residual magnetism. This is intolerable in a relay like the N.A. relay which has a weak pull.

Since only a few relays are involved we suggest that they be replaced with modern relays. Ask the manufacturer of your board about this.

If the line lamp circuit extends outside of the office (i.e., if no line relays are used), the entire outside plant leakage will flow through the night alarm relay. This leakage varies with the weather and other conditions and, if the circuit which we have just described were in use, it would be impossible to keep the night alarm relay adjusted.

Several small boards have been developed which do not have line relays. Such boards are less expensive and require less maintenance. The night alarm circuit of this type of board must be quite different from the one we have described. We will discuss this in our next article.

Formidable Combination

"Finding 637 million dollars a year for new freight cars is made vastly more difficult by the combination of the low level of railroad earnings, the 52 per cent corporate federal income tax on those earnings, and the inflationary pressures which have rendered depreciation reserves completely inadequate for the replacement of worn-out equipment."—WILLIAM T. FARICY, *president, Association of American Railroads.*

March of Mexican Telephony —Jungle Drums to Solar Rays

By THELMA NANCE*

LONG BEFORE COLUMBUS charted his historic voyage, communications on the American continent had become an important facet in tribal life. Jungle drums pounded out the messages of the Olmecs and the Toltecs. At a later period the Aztecs issued their calls to worship at the pyramids to honor the sun and the moon. Then there was the conch shell which had its role in relaying messages in the early days of Mexico's civilizations.

Those primitive means of transmitting messages present a sharp contrast to Mexico's present modern system of communications.

On a recent visit to Mexico City, we found the Telefonos de Mexico providing a form of communication that meets today's challenge for the best in speed and efficiency.

My first encounter with the city's privately-owned telephone system came when I decided to place a call through an attended paystation. I was greeted by a charming operator who spoke flawless English. She worked in a modernistic setting complete with tropical plants. My call went through, and I heard a familiar voice more than a thousand miles away.

Later, we had the opportunity of seeing the hub of the country's telephone network—the offices of Telefonos de Mexico. In Mexico City, modern buildings of glass and marble, enhanced inside by planters and large vases of gladioli, are the order of the day, and the telephone company is no exception. As you sink into an easy chair and choose a magazine (in either Spanish or English), you decide that it's a joy to wait. It really doesn't matter if *un momentito* should be a little longer.

All about the office are reminders of the office at home—the busy employes, the adding machines and typewriters, and the placards advertising extension telephones. Even the sorting of mail rang a familiar note. While we were trying to figure out which was the "in" basket and which was the "out," someone suggested that we might like to see "Univac," that marvel of electricity which surely must have a brain inside. Mexico has metered service and that electronic wizard sorted at a rate of 150 cards per minute, calling attention to any abnormal situation. I began to wonder if that apparatus could possibly have its eye on my job back home!

THELMA NANCE

The General Telephone Co., we found, is well known by many whom we met in Mexico City, and we felt a warm glow in knowing that friendship knows no borderline. Everyone smiled and greetings were returned with the graciousness so characteristic of our neighbors to the south. It was about coffee time, and then came a surprise—there are no coffee breaks. How could we have kept this good old American custom so isolated?

But there were more surprises to come.

We heard about the installation of the new colored "standset," the single-unit telephone that could easily pass for a beautiful piece of modern statuary. In reality it is a new idea in lighter, easier-to-handle telephones. It was originated by the famed Ericsson of Sweden and logically called the Ericofon. Imagine being able to use one of those beauties to order tickets for next week's bull fight!

There are currently more than 380,000 telephones in operation in Mexico. We were surprised to learn that almost all the service is on a one-party line basis because "Latins do not like to share their conversations." (One hour at my commercial desk back at home will prove that such feelings are just as true States-side!)

We also learned that service is installed on a somewhat different basis in Mexico, and that the stockholders draw what to us would seem like a high return or dividend. At one time, there were two telephone companies there. A merger brought forth the present one which has grown rapidly. Present plans call for a new administration building. We wondered if it will be similar to Mexico City's communications building, an example of ultra-modern architecture with murals in native stone.

There are plant installations for each of the six sections of the city. You can see the new blue trucks and a small version of the motorcycle used for trouble calls. It's easy to understand that the unbelievably low rates and the modern, expensive equipment bring about a problem which is taking first interest in the industry.

We learned other interesting things:

Far more than 50 per cent of the company's collections are made through the 40 branch offices of the Bank of Commerce.

Toll calls have increased around 70 or 80 per cent in recent years.

Latins do not answer the telephone with "hello" but the *bueno*. This follows the European practice and is an equivalent of "Are you there"; "I am ready"; or just plain "OK."

Mexico's engineers are working on the theory of converting solar energy to power for industrial use. (The Aztecs had perception when they recognized the importance of the sun in their daily life.)

We also learned that "Telephones present about the same problems all over the world, and the industry has a tendency to meet those problems in a similar manner wherever they are."

We looked back on our visit to Telefonos de Mexico with a sense of pride that we, ourselves, have a small part in an industry which links the globe to provide a vital service. In fact, we could heartily say, *"Viva Telefonos de Mexico! A sus ordenes*"*

*Mrs. Thelma Nance, who has been with General Telephone Co. of the Southwest in Texarkana since 1942, recently vacationed in Mexico City and was taken on a conducted tour of the Mexico City telephone office. Mrs. Nance has served in various capacities with General and is now an assistant cashier.

*"A sus ordenes" is a phrase meaning "at your orders," and is used by the traffic department to answer signals.

today's Highlights

of finance-taxes-business trends

by Willard F. Stanley

INTEREST RATES STILL ON THE RISE: After a moderate recession last month, interest rates have again pointed upward, sparked by the increase in prime commercial bank rate from 4 per cent to 4½ per cent, promptly followed by a rise in the Federal Reserve rediscount rate from 3 per cent to 3½ per cent, both of these rates being the highest in 33 years. Next, treasury bills sold on practically a 3.5 per cent basis, highest since 1933. Impact of these developments has already affected the long-term bond market as evidenced by the offering on Aug. 14 of double "A" rated First Mortgage Bonds of Northern States Power Corp. on a 5 per cent yield basis.

Most dangerous sign on the funded-debt-rate horizon seems to be the large accumulation of this type of financing which will come to market in September and early Fall. Offerings in August were relatively sparse but, as usual at this season, a backlog is building up which may prove difficult for underwriters to absorb without moving long-term interest rates up again. It's difficult to predict whether the June peak rates will be exceeded in September, but with this high rate of demand for long term money continuing, from all sources, any marked lessening in rates from present levels seems unlikely for a few months to come.

Wall Street Journal's new bond issue tabulation shows practically no change in the average yields on 18 new utility bond issues as between yields based on offering prices and those based on bids at Aug. 9. Last month a 9 decimal (0.09 per cent per annum) lower average yield was indicated on the bid side. Part of this adverse change is no doubt due to the somewhat lower rates on new issues offered in July.

Unless a temporary switching of funded debt to additional common stock is feasible (as suggested last month), there seems no reason for utilities either to retard or accelerate new funded debt offerings where funds from this source will be needed shortly. Utility common stocks continue to reflect dividend yields and price-earnings ratios which should make maximum equity offerings attractive at present levels from the viewpoint of the issuing companies.

* * * *

STOCKS SWING DOWN AGAIN: Continuing their "see-saw" pattern—followed now for nearly two years—stock averages turned down again quite sharply during the last 30 days and pierced the average at last year's close again. The 50 combined stock average of the New York Times was 6.5 per cent below the Dec. 31, 1956 level at Aug.

Mr. Stanley, formerly financial vice president of Southwestern Public Service Co., an electric utility with over 160 million dollars in assets, is president of Corporate Services, Inc. of New York City. He is a member of Controllers Institute of America and New York Society of Security Analysts. He serves on three committees of the Controllers Institute having to do with federal taxation, social security and finance management. His articles are appearing once a month in TELEPHONY.

19, whereas at July 19, this average was 2 per cent above the average at the end of last year.

Reports from about 750 corporations indicate a 6 per cent increase for the first half year earnings as compared with 1956. About three out of every five companies reporting showed gains for this period. Business is still active and earnings still generally forging ahead, but more selectively at a slower pace. Little change in business activity is expected until the last quarter of the year. Backlogs seem to be receding somewhat in a number of lines and a pick-up in orders will be needed by Fall if the present high sales level is to continue. Any falling off in late fall business could operate to reduce 1958 expansion expenditures, which, in turn, could affect the business level for that year. Moderate swings of the stock-average pendulum still seem the logical prediction for the next few months. Sharp movements in either direction (10 per cent or more) would be surprising as things now stand.

* * * *

TAX-FREE DIVIDENDS ON UTILITY EQUITIES: Our May 25 column pointed out advantages to investors, particularly to those in high income tax brackets, of acquiring electric utility stocks a substantial portion of whose dividends are "tax-free" as ordinary income. It was also mentioned that in many cases this non-taxability is not only substantial in percentage, but is likely to recur for a number of years, being caused by continuing, rather than special, factors.

The following is a list of companies in this category, set forth alphabetically: Central Hudson Gas & Electric, Detroit Edison, Hartford Electric, New England Electric System, Pacific Power & Light, Rockland Light & Power, Southwestern Public Service, United Corp., Washington Water Power.

The tax-free percentage varies considerably between different companies and also varies from year to year in the same company. Investors' brokers should usually be in a position to supply the approximate non-taxable percentage in each case and also an estimate of how long the non-taxable feature is likely to continue on a substantial basis. The table below shows the increase in "after-tax" income to an investor in various top income tax brackets, assuming purchase of an electric utility stock yielding 5 per cent in dividends, of which 40 per cent is assumed to be non-taxable, as compared with a utility common stock with the same yield but where 100 per cent of the dividends are taxable. A non-taxable percentage as high as 40 is believed to be applicable to a number of the companies listed above.

Investor's Top Income Tax Bracket

70%			50%			30%		
A	B	C	A	B	C	A	B	C
1.5%	2.9%*	93%	2.5%	3.5%	40%	3.5%	4.1%*	17%

A—After-tax net dividend yield, assuming 100 per cent of dividends taxable.
B—After-tax net dividend yield, assuming 60 per cent of dividends taxable.
C—Percentage increase after-tax net dividend yield—B over A.
*Before allowing for payment of capital gain tax on subsequent sale.

Where a portion of dividends are non-taxable as ordinary income, this amount is treated for tax purposes as a return of capital to the investor, and applied to reduce his cost of the stock. This increases the capital gain (or decreases capital loss) upon subsequent sale. However, the capital gain tax rate is substantially below the rates applicable to ordinary income. This saving of rate is particularly large where the top bracket substantially exceeds 50 per cent, but in no case is the capital gain rate more than 50 per cent of the ordinary tax rate. Also the taxpayer has the free use of the taxes during the interval from receipt of the dividend to the time of sale. Furthermore, in many cases, capital gain taxes will never become payable, because the stock will pass to others by inheritance before being sold.

TELEPHONY'S ELECTRONICS SECTION

BY HAROLD B. McKAY, ELECTRONICS EDITOR

ELECTRONICS AND MERCHANDISING

GOOD merchandising in the telephone field consists of more than selling extensions and colored handsets. A spokesman for AT&T in talks before engineering groups declared that we must make telephone service easy to get and easy and pleasant to use, so that people will use it more.

It also means having modern facilities in the plant, and being a step ahead of anticipated public demand. This means always having a new product or service to sell as soon as the customer is ready to buy it. This makes electronics of prime concern to management, because most of the new goods and services in the telephone field will be in the electronics field.

MICROWAVE

MICROWAVE transmission facilities are becoming an increasing part of telephone plant, and new services will require application of this kind of equipment to short-haul circuits where radio would not even have been considered a few years ago. At present 22 per cent of Bell System's long distance telephone circuit mileage is on microwave radio. Prophecies made before the recent FCC hearings on microwave frequency allocations indicate that this percentage will increase rapidly.

Already in the works is Bell's new TH system, a 6000 mc microwave which will operate over the same kind of routes as the present cross-country TD-2 system. The route capacity of this kind of gear is 10,000 telephone circuits, or 12 TV plus 2,500 telephone circuits.

Another new development is the TJ microwave, which is a short-haul system operating in the 10,700 mc band. It will handle 720 telephone or six television circuits over a maximum distance of 200 miles for voice circuits and 100 miles for video.

The increasing demand for closed circuit television and the rapidly developing art of slow-scan video will soon put many small telephone companies in the electronics business. Data circuits also are on the increase, and some of these require inter-city circuits of very high quality.

Circuit mileage of intercity routes has increased at the rate of about 12 per cent a year and is still growing. AT&T men foresee microwave even on routes between central offices, and between central offices and concentrator units.

The 1956 annual FCC report shows that Independent telephone companies were authorized to construct microwave systems costing an estimated 2 million dollars. It may be expected that this figure will also increase.

MICROWAVE CIRCULATOR

A RAY of light or a beam of radio energy may be thought of as having waves that vibrate in all directions, unless they have been polarized. When polarized, they vibrate in one direction only, much as the waves on water are horizontal, and the waving of a flag is vertical. In radio, broadcast stations usually have vertically polarized waves, and are sent and

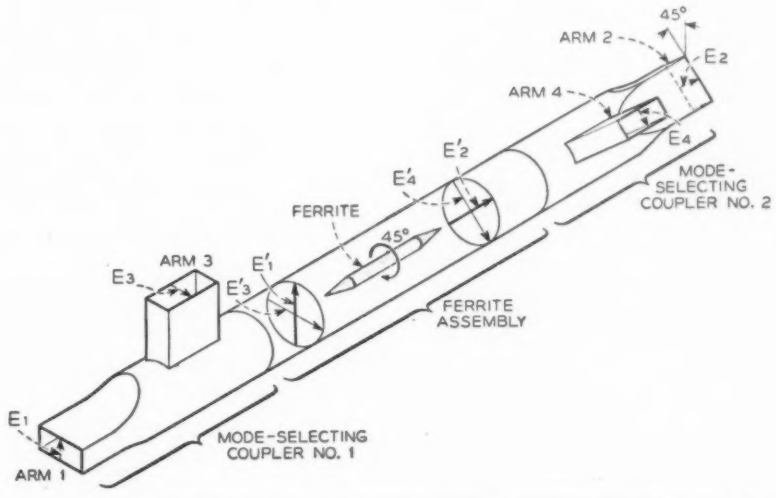


Fig. 1. The ideal circulator—a central ferrite assembly with a mode-selecting coupler on other end. (Drawing from Bell Telephone Record.)

received on vertical or whip type antennas. TV stations are horizontally polarized and use horizontal antennas. Light reflecting from a flat horizontal surface is horizontally polarized, and "Polaroid" type sunglasses, arranged to receive only vertically polarized light, therefore, eliminates the horizontal glare.

Once a ray of energy is polarized, the plane or angle of polarization can be changed by different devices. Michael Faraday discovered this, and the effect is known as "Faraday rotation." For instance, a beam of radio energy, polarized in any single direction can be sent through one of the new ceramic-like magnetic materials called ferrites, and the angle or polarization can be changed.

This unique property is the basis of a new device called a "Broad-band Microwave Circulator." According to the *Bell Laboratories Record*, the new device is designed to work in the 10.7 kilo-megacycle region which is being developed for short-haul telephone microwave.

The operating principle of the circulator depends upon the fact that rotation of the plane of polarization through the ferrite is always in the same direction. In other words if a microwave traveling away from the observer was rotated clockwise, any reflected wave would also be reflected clockwise.

A waveguide can be made to receive or send waves only in a certain "mode," such as vertical or horizontal. Therefore, if such waveguides are coupled to a ferrite device, the microwaves can be sent in as one mode and sort of twisted around and brought out someplace else.

Among other things, this feature can be used to eliminate reflections from the distant end. This is possible, because a reflected wave is twisted around so that it will not go back out through the waveguide that brought the orginal wave in.

This is illustrated in *Fig. 1* where the incoming wave E_1, oriented as shown, could enter arm 1, but would not come out anywhere because no other arm is oriented to the same plane of polarization. However, the magnetized ferrite will turn the polarization so that wave will leave the ferrite slanted as shown at E'_2

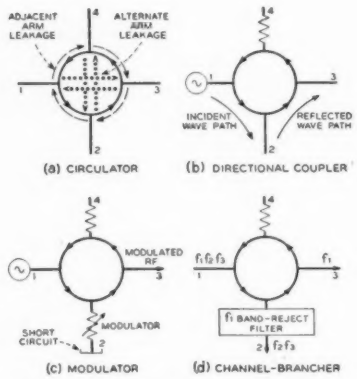


Fig. 2. Symbol for the ideal circulator, showing two types of leakage (a), and symbols for three possible applications of this device. (Drawings from Bell Laboratories Record.)

and pass on through arm 2 where it is shown as E_2. This wave will not exit through the other arms because they are not oriented to receive it.

However, and this is the important fact, any energy coming back in through arm 2 will go out through arm 3, because the ferrite turns the returning wave 45° in the same, continuing direction that the first wave experienced. By the same reasoning, it can be seen that energy entering arm 3 will leave only through arm 4, and energy entering arm 4 will leave only through arm 1.

Thus, a directional coupler or isolator can be built, which will transmit energy in one direction freely, but can detour any backward moving waves into a trap or other circuit. Some of the possible uses of this type of device are shown in *Fig. 2*, which schematically portrays the circulator as a "traffic circle." At (a) is shown the concept of energy entering any arm and being transmitted to the next arm. Any reflections from the second arm would be transmitted to and emerge from the third arm. The dotted paths represent leakage within the device. A directional coupler is portrayed at (b). A modulator could be built as in (c). Here the RF Wave from arm 1 would be steered into arm 2 to where it could be modulated and reflected back from the short circuit to come out as modulated RF at arm 3.

At (d) is demonstrated the idea that three frequencies on arm 1 could be separated by passing two of them through a filter in arm 2 and causing the third to reflect back and come out at arm 3.

The ideal ferrite circulator is limited somewhat by physical properties of the ferrite itself, but careful attention to design has resulted in the development of a broad-band device which is satisfactory for transmission circuits.

CARRIER TELEPHONE TERMINAL

EVERY once in a while a piece of equipment turns up that seems to have just about every little detail worked out in advance. Such a device is the F1450 carrier terminal made by Radio Engineering Products of Canada. Manufactured to strict military specifications the equipment is about as versatile and adaptable as one could wish for.

Its unique features include built-in testing apparatus and a construction which puts all tubes and external connection points on the front of the panel where they may be quickly checked with a minimum of effort. As the accompanying photo shows, the chassis opens up like the pages

of a book to give immediate access to the interior.

The system provides for a basic four channels on frequencies of 8, 12, 16 and 20 kilocycles, all of which are derived from harmonics of a high stability of 4 kc crystal oscillator. The lower sidebands in a single sideband suppressed carrier arrangement are used. Switches are provided for connecting either two or four-wire loops to the system.

The channel width is 300 to 3,500 cycles within 2db when in-band signalling is used, but out-of-band signalling can also be used at 3,450 cycles. This reduces the speech channel to 3,300 cycles. An order wire channel is also supplied which features a signaling system and a volume limiter circuit.

The frequency space between the order wire channel and the lowest carrier-derived channel is utilized for the transmission of a group of carrier telegraph channels. Miniaturized frequency-shift carrier telegraph terminals can be supplied for use in this band or in the voice frequency bands. Simultaneous telephone and telegraph operation on the channels is possible, and arrangements are made so that 20 cycle or dc ringing signals will not interfere with the telegraph circuit.

Either 20 cycle ac or E&M dc signaling may be used with this carrier, which converts the signals to 3,450 cycle ac for transmission where the out-of-band option is used.

Testing

The test facilities include features for use in both maintenance and line-up. A built-in meter with center zero can check the ac line voltage, the dc cathode current of each tube and the transmission level. A 1,600-cycle oscillator is included in the equipment for making all necessary transmission tests.

Each channel is equipped with a three-position switch. In the lower position the channel is connected for four-wire operation. In the center it is connected for two-wire use and in the upper position it is connected for testing. A separate test switch permits three different interconnections for testing the channels. These three arrangements are:

(1) Transmit level test: A 1,600-cycle tone is sent into the transmit part of the four-wire voice section. The test meter is at the same time connected to the output of the transmitting group amplifier.

(2) Remote Test: A 1,600-cycle tone is sent from each end of the system and measured as it is received at the opposite ends.

(3) Local or loop test: The transmit portion of one terminal is fed back into its own receiver so that the test tone can be sent and received at the same end.

Each of the channels includes a volume limiter which cuts down the volume of loud talkers to avoid cross-talk in other channels. Compandors are available for external connection.

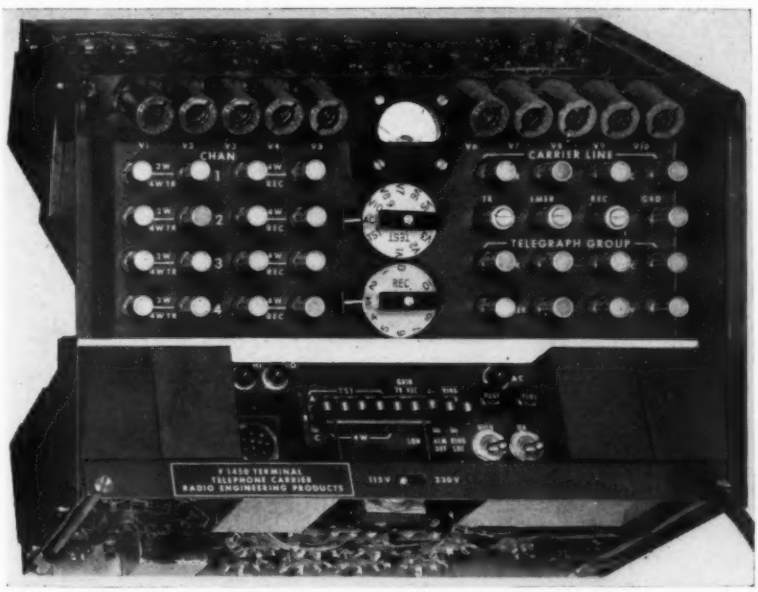
The maximum differential delay for four-wire connections is less than 300 microseconds which makes the system acceptable for most data circuits.

Operation is possible over 40 miles of loaded spiral four cable or 15 miles of non-loaded spiral four, or 12.5 miles of 20 ga. quadded toll cable or 200 miles of 128 mil copper-clad steel open wire pairs. Repeaters are available for operation over longer distances. Optional frequency assignments are available for coordinating with type C or O systems on the same lead, and assignments can also be made for two-wire line operation using a group modem.

Regulation is accomplished by eight-kilocycle pilot tones which are transmitted from the terminals of the system, and external attenuation equalizers can be supplied if needed in special applications.

24 Channels

A grouping arrangement called the F1830 terminal permits working five of the above described F1450 units into one system to provide 24 channels. Transmission is on a four-wire basis and uses a frequency



This carrier features tubes and connections on its front panel, built in test equipment, and a chassis that opens like a book for easy servicing.

range of 300 cycles to 110.1 kilocycles in each direction. It will operate over a radio link or non-loaded spiral four. It will work through a maximum attenuation of 29 db which is a cable length of nearly six miles.

When operating as a 24-channel system, each F1450 terminal retains its automatic transmission regulator, alarms and test facilities, and one or more units can be removed from the system without affecting the remainder.

RADIO REGISTRY

A NEW book in the series of radio stations registries has been issued by the Communication Engineering Book Co., of Radio Hill, Monterey, Mass. This volume contains listings of radio transmitters operated by public safety systems, including state, county and municipal police, fire departments, highway maintenance, forestry and special emergency services.

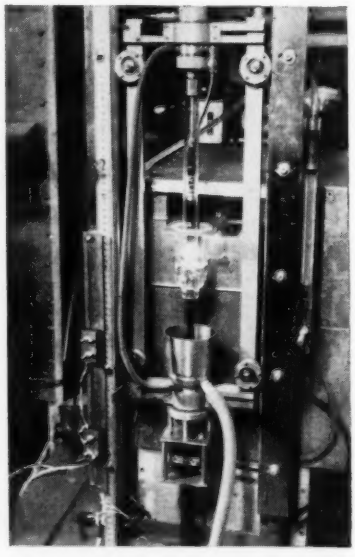
The listings are taken direct from records of the Federal Communications Commission and are double checked by inquiry made to the station licensee. The information given includes call letters, frequency, type of modulation, make of equipment and number of units.

The first part of the book lists by class of service (police, fire, etc.) and by states. The second part of the book contains a station listing by frequencies. This is extremely valuable to radio station operators who may be experiencing interference from other stations. This listing shows all stations operating on the same frequency and gives their location.

This registry, which costs $4.00 is one of a series of four which are issued annually by this publisher. The others are Transportation, Industrial and Common Carrier. They are available on a subscription basis of $12 a year for all four.

SILICON REFINING

THE success and development of the transistor and other semi-conductor devices has depended upon the refining of materials to the point where impurities are only one part in a billion of the finished product. The attainment of this high order purity is one of the real triumphs behind the transistor development. The



A crystal of silicon is being refined by the automatic floating zone refining equipment developed at Bell Telephone Laboratories.

technique, which is called floating zone refining, is now accomplished automatically by a new machine developed by the Bell Telephone Laboratories.

The principle of operation depends upon the fact that most impurities are more soluble in molten than in solid material. That is, when a material freezes, many dissolved substances are sort of squeezed out. Original experiments consisted of electronically melting a layer of material in a container, but in order to obtain the purity required with silicon, a container could not be used. This was because the container itself would add impurities.

So a machine was developed which holds a rod of silicon vertically. A 4-megacycle electric field at 10,000 watts is directed into a thin layer through the rod. This turns a thin disk of the rod into liquid, but surface tension keeps it from running out.

The rod is slowly drawn through the heating field, so the layer of melted material travels along the rod, sort of "milking" the impurities out of the material along with it. Many such passes through the field are made in order to obtain the desired purity.

RECEIVER AMPLIFIER

A NEW amplifier for persons with impaired hearing is now being made by Stromberg-Carlson, a division of General Dynamics Corp. Designated the RA-1000 it is a single stage transistor device that can be attached to any standard telephone. It may be either desk or wall mounted.

A compact device, the new attachment is enclosed in a molded plastic case and is connected into the set by means of a four-conductor cord, at the point where the receiver normally connects. It needs only 2 milliamperes or less for operation, and it gets this power from the central office battery supplying the transmitter.

Gains up to 16 db can be obtained by means of the volume control on the device.

ELECTRIC VEST

A FLEXIBLE battery, which can be worn like a vest has been patented by Herman H. Bly and assigned to the Secretary of the Army. Designed to power walkie talkie

radios, the battery is enclosed in a material which is waterproof, yet porous enough to permit escape of gas, caused by chemical action in the cells.

ELECTRONIC NOTES

FUNDAMENTALS of carrier is the title of a newly revised section of the REA Telephone Engineering and Construction Manual. Designated Section 901, it contains 37 pages of tersely written basic principles of carrier operation. While not pretending to be a complete text on carrier theory, the section nevertheless presents a good description of the various parts of carrier systems and an explanation of the function of each.

The REA manual is issued primarily to REA borrowers, but individual sections can be obtained on request from the Rural Electrification Administration, Washington, D. C.

•

SILICON rectifiers, the remarkable high temperature, high current devices recently developed are now available from the United States Dynamic Corp., 1250 Columbus Ave., Boston 20, Mass. A catalog of these devices, including data on some new experimental types, is available from that company upon request.

•

PHOTOGRAPHIC traces on a cathode ray oscilloscope is the subject of an article in the current issue of the *Du Mont Instrument Journal*. While recurrent scope traces are easy to photograph because repeated traces fall in the same position, transients are another matter. This is because such responses may only occur once, and their speed may be such that the light intensity is very low.

At the request of the Du Mont Company, the Eastman Kodak Co., conducted a series of tests to determine the best means of photographing such transient phenomena. The use of Tri-X film and D-19 developer was recommended by the Eastman company, but methods of gaining effective increased emulsion speed are also discussed.

You can get a copy of the *Du Mont Instrument Journal* by writing to the Technical Products Division of the Allen B. Du Mont Laboratories, 760 Bloomfield Ave., Clifton, N. J.

Licensed Telephone Technicians

at your FINGERTIPS

for mobile radio... microwave...carrier ...repeaters, etc.

HOW TO TRAIN YOUR TECHNICIANS FOR ELECTRONIC MAINTENANCE

Here is a proven plan for providing training, in electronics for your present technical staff. The great development of electronic devices for use in telephony makes it imperative to mentally "re-tool" your men.

Many telephone companies have enrolled their technicians for training. The West Coast Telephone Company selected our Employers' Plan for training their men. One group has completed its training and a second group is well under way. In less than a year they have acquired a group of experienced telephone technicians who know electronics.

For full details on our Employers' Plan send for a free copy of our illustrated booklet.

send for your FREE COPY today!

Fill out the coupon for your Free copy!

Cleveland Institute of Radio Electronics
4900 Euclid Bldg., Dept. TE-8
Cleveland 3, Ohio

Please send full information on your Employers' Plan for training technicians.

NAME _____

POSITION _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

DEPARTMENT OF TECHNOLOGY
AND ERIE COUNTY PUBLIC LIBRARY

Atomic submarines . . . and us

by John Voss

Here in our neck of the woods, recently, there's been a rash of mergers which, at first glance, seem to put together some very dissimilar businesses.

An optical goods maker, for example, is one half of a partnership in which the second firm produces tape recorders. A manufacturer of helicopters is negotiating a deal which will put the parent company also in the fields of office furniture and fire extinguishers. And Stromberg-Carlson, of course, by joining General Dynamics, is keeping company with atomic-powered submarines, jet aircraft, guided missiles, marine motors and austranautics.

Actually, a diversity of products is a strong asset to a successful merger. The important consideration is the basic *strengthening* of each of the companies that join their forces.

Take our situation. Sure, we dovetail a lot with other General Dynamics divisions. We made the battle-announcing sound equipment on the nuclear-powered subs, *Nautilus* and *Seawolf*, built by Electric Boat. We built a test-equipment system for some of Convair's guided missiles. We designed the electronic computers for control of Electric Boat's fabulous screw-jack mechanism for the U. S. Air Force supersonic wind tunnel at Tullahoma, Tennessee.

But that's only part of the breadth of experience gained from our merger.

In 1956, consolidated net sales of General Dynamics divisions exceeded the billion dollar mark. This means financial stability—the promise of permanence—and the resources which make expansion practical and quick. Just for example, the great growth of our work in electronic and automation projects enabled us to purchase a whole new factory for those departments—and gives the Telecommunication Division another quarter-million square feet of space in which to serve *your* needs.

There's also the whole spirit of dynamic impatience with the *status quo* which permeates a group of companies like the General Dynamics family. This may sound exaggerated, but it is true: I have never yet heard a project discussed—no matter how futuristic or untried its concept—without our engineers, and those of our sister companies, saying: Could be—anyhow, let's have a "go" at it!

Transistorizing, for example, has been studied for years in our labs. Our research and developments in the application of analog and digital computers to communications are solid—and far-reaching. And if I told you some of the things we already have ready for the age of electronic switching, I'd have my company's security people right on my neck!

I'm proud as punch that Stromberg-Carlson is a division of General Dynamics Corporation. I'm also completely *aware* of the benefits this affiliation offers you, in imaginative, progressive development of the art of telephony for *your* future.

John H Voss

Vice President and General Manager
Telecommunication Division

STROMBERG-CARLSON, A Division of General Dynamics Corp., Rochester 3, N. Y.

Advertisement

XUM

THE Plant Man's Notebook

BY RAY BLAIN, TECHNICAL EDITORIAL DIRECTOR

WE ARE INDEBTED to Harold L. Ericson, of the Ericson Engineering Co., Hector, Minn., for additional information on the use of vibration dampers on open wire lines. Mr. Ericson refers to a remark that we made on this page in the June 29 issue, to the effect that when conductors are properly installed with low normal tensions, vibration is not ordinarily a serious problem.

He then furnished the following additional information on this subject:

"In certain parts of Minnesota, the Dakotas and other great plains states, experience has indicated that serious abrasion to the conductor occurs at the ties and insulators in the case of 135 grade steel conductors strung at manufacturers' recommended tension and tied with recommended ties, within the first year after construction.

"Our experience indicates that this abrasion is not due to 'fairly large amplitude' vibration, but rather to a low amplitude vibration which occurs almost continuously when the wind is blowing.

"The spiral vibration damper to which you refer is a rather expensive item by comparison to the damper generally used in this area. We use a plastic tube type dampener with a spiral cut for ease in applying to the conductor.

"These tubes are 18 inches long x ⅜ inch O.D. x ¼ inch I.D. and cost less than 10 cents each in quantities.

"The plastic tube type dampener has proved effective and has also permitted some companies to string their conductors at an increased tension to reduce the incidence of mid span hits where long span construction is used in windy areas."

•

There is a probability that some time in the future we may have wave guides connecting large centers of population as we now have coaxial cables and microwave systems.

To further research of this nature, the Bell Telephone Laboratories' engineers have recently installed a precisely engineered double pipeline stretching for more than 2 miles underground at Holmdel, N. J. So that the scientists may evaluate various kinds of wave guides (which resemble empty pipes), there are 27 concrete manholes or pits built into this underground system.

Theoretically, these copper tubes or wave guides could carry thousands of telephone conversations or hundreds of television programs. A system of this type would provide communication highways of giant capacity which no doubt will be required to meet the needs of future generations.

•

We all know that competition for good engineers is terrific and many concerns are not above taking men from rival concerns by fair means or foul.

One firm recently sent a personnel executive to an electronics convention with instruction to hire all the bright young talent he could find. The personnel man was not able to hire any engineers, but he did locate a better job for himself.

•

We noticed recently that emergency telephones are installed at regular intervals on the Tri-borough Bridge in New York City and on the Delaware Memorial Bridge at Newcastle, Del.

These telephones certainly serve a most useful purpose to motorists who have car trouble or are involved in accidents on these heavy trafficways.

•

The AAA's annual survey of car troubles reveals that one breakdown per year is par for each of the nation's 54 million automobiles. The lowly "flat" led the list, despite the fact that most new cars are now using tubeless tires.

Battery and electrical faults ran a close second, and ignition troubles third. More than 2 million drivers ran out of gas while another 851,000 locked their keys inside the car. For the first time, carburetor malfunctions climbed ahead of starter difficulties in frequency — 1,883,000 to 1,574,000. This was attributed to the increased use of complicated dual and triple carburetor installations.

•

We understand that the New York Telephone Co. is presently making plans to conduct a trial run on person-to-person collect and credit card calls from a limited number of business customers.

It is further understood that this test is scheduled to get under way early in 1958. The results are certain to prove interesting.

•

The Kato Engineering Co. has developed a compact, light-weight converter that changes 115-volt, 60-cycle ac to three-phase, 230-volt, 60-cycle current. The frequency is held constant within a fraction of a cycle.

There has been an urgent need of many years standing for a converter of this type in the communications field. Models are available in five sizes ranging from 500 to 2500 watts.

•

It is rather amazing to note the number of retired Bell engineers who are working for the government in Washington. We know many of them personally and they are all doing a wonderful job, and taking a great interest in their work. The majority are hale and hearty and there is no doubt that they are much happier than they would be just loafing. They are all over 65 and a considerable number of them are in their seventies. In the majority of cases, these men are off the job because of illness much less than most men half their age.

•

We are advised by the American Wood Preservers Institute that wooden poles were first used to support a com-

(Please turn to page 34)

Here's W

e's Why Telephone Men Choose

STROWGER AUTOMATIC...

From Maine to California...from small unattended exchanges to large multi-office networks, telephone men have learned that Strowger Automatic is the best equipment for their exchanges. The wisdom of their decision lies in five basic reasons. Check these advantages. See why you, too, can profit with Strowger Automatic.

1. Simplicity of design insures minimum maintenance. Strowger Automatic equipment operates on a step-by-step principle and is designed with the simplest possible construction. This keeps adjustments and repairs to a minimum. The position of the switching components permits visual tracing of circuit operation. This speeds your initial training of personnel and makes trouble-shooting quick and easy.

2. Backed by 65 years of engineering know-how. Strowger Automatic is the only switching equipment in the world which is backed by 65 years of systems engineering, documented experience and continuous performance in all types of telephone exchanges. Your A.E. representative refers to this vast store-house of knowledge when analyzing your problems.

3. Quality construction gives you dependable service. You must see a Strowger installation to appreciate the craftsmanship of this precision-engineered equipment. Each part is made of the finest quality materials and assembled by skilled workers for long wear and dependable service.

4. Flexible design adaptable to your future needs. Strowger Automatic equipment is assembled in small, self-contained units. The number of units can be easily increased or decreased to meet your traffic changes. Whatever your demands, the simple circuits and unitized construction of Strowger Automatic equipment meets them simply and economically.

5. Meets the challenge of progress. For 65 years Strowger Automatic has proven its flexibility by meeting every new requirement of changing conditions without obsolescence.

Prove it for yourself! Visit a Strowger Automatic exchange. See the simplicity and flexibility of design...See the craftsmanship and quality of construction. Then get in touch with us. We'll be glad to help you in any way possible. Write *Automatic Electric Sales Corporation, Northlake, Illinois. Or call Fillmore 5-7111.*

AUTOMATIC ELECTRIC

A member of the General Telephone System—One of America's great communications systems

GENERAL SYSTEM

XUM

munications system in the United States in 1844 when a commercial telegraph line was built between Washington, D. C., and Baltimore, Md., under direction of Samuel F. B. Morse.

In 1882, poles were used in transmission lines when Thomas A. Edison built the world's first electric generating plant in New York City to serve urban customers.

A major portion of the annual output of pressure-treated poles is still taken by the public utilities of this country to carry telephone, telegraph, and electric power transmission lines.

•

We recently heard of an avid baseball fan who watches one game on TV, with the sound turned off. At the same time he listens to a second game on radio.

It would certainly seem that this is one method to get the most out of modern communication.

•

Back in the early days of the telephone business a complaint was registered by the owner of a small exchange in Iowa who declared that some subscribers were taking the dry cell batteries out of their telephones and using them in their automobiles. Then the old worn out dry cells taken from the automobile were installed in the telephone. It meant that a troubleman must be sent out to install new batteries in the telephone and that the whole thing was a nuisance.

•

It is a good idea to carry the following items in your car at all times: flashlight; first-aid kit; pencils and paper; tape line or a carpenter's folding rule, and a list of your insurance company's adjusters.

•

The writer remembers way back when if you had a need for a few No. 6 dry cells you could go to the nearest hardware store and buy them for 25 cents each. The other day we had a need for two dry cells and we found them at the hardware store all right, but they cost us $1.05 each.

•

The telephone number of the Nation's Capital in Washington, D. C., was recently changed from NAtional 8-3120 to CApital 4-3121. In deference to creatures of habit, the telephone company has made arrangements whereby the old number may also be used for a period of six months.

Plant Man's QUIZ

By RAY BLAIN, Technical Editorial Director

Q. What type transmission measuring set is recommended for use in the average modern dial telephone exchange?

A. Various types of transmission sets now on the market should adequately meet your needs.

One such set has been designed to provide the transmission measurements most frequently required in a modern telephone system. These measurements can be made at a number of different frequencies covering the normal speech-transmission band. In addition, the unit will measure the voltage, current and resistance values most commonly encountered in the system.

Transistoring of the oscillator has resulted in a compact, lightweight and fully self-contained unit.

The instrument contains an oscillator section permitting transmission of several normalized "send" levels at different frequencies in the audio range; a level measuring section permitting measurement of send and receive levels and self-contained switching permitting rapid measurements of "straightaway" and "loop-insertion" losses.

In addition, the instrument contains an analyzer section permitting measurements of voltage, current, and resistance.

The oscillator can be switched to provide frequencies of 250-500-1000-2000 and 2500 cps. Other or additional frequencies can be provided on special order. The set can also be obtained for a 600-ohm or a 900-ohm circuit.

•

Q. When an electric-powered dehumidifier is used in an unattended automatic exchange, what method may be used to make sure that the humidity is controlled at the proper level at all times?

A. One method — and perhaps the best available at this time—is the use of a humidistat. While these devices are not claimed to be 100 per cent accurate, they are nearly enough so for all practical purposes.

This instrument is set at the per cent humidity level required and the dehumidifier cuts in and out, as necessary, to provide moisture control at this level.

•

Q. Will it be possible to procure artificial lines that may be used to simulate certain conditions which are actually found in cable distribution systems? This equipment is desired to make tests and prove calculations so that we are certain that adequate transmission will be provided.

A. Artificial line units are now available which can be switched and patched to simulate proposed transmission circuits.

This method will permit accurate measurements of transmission for different conditions of loading, matching, amplifications, etc. These units were developed to reduce engineering time required for computing such circuits.

Two models of artificial line units are available, each containing six separate sections.

A single rotary switch in each individual section adjusts the section to represent any of the following types of cable: AWG's—13-16-19-22-24-26.

Input and output of all sections can be picked up and isolated from other sections by plugging into "terminating" jacks. Bridging jacks are also provided.

One model is equipped with six sections of 3000 feet each. Each section contains nine resistors, two condensers and two inductors. The individual values are varied according to the switch position.

The other model has four sections of 1000 feet, each containing two condensers and six resistors, and two sections of 500 feet, each containing one condenser and four resistors. The resistor values are changed by a rotary switch according to the wire gauge selected.

Panels containing special combinations for 3000-foot, 1000-foot and 500-foot sections can be provided on special order. The units are 19 inches x 5¼ inches and are arranged for rack mounting.

XUM

Square Wave Testing

By HAROLD B. McKAY

TELEPHONY's Electronics Editor

Part 3

IN SOME applications, it has been found desirable to use more than one frequency in making tests. This can also be tried in telephone work. For instance, with coils or components which are known to have a high frequency cut-off point which is lower than the examples given in Part 2 (TELEPHONY, Aug. 24, p. 23), a very low frequency of say 30 cycles might be used to get a good square wave picture of the high frequency cut off point.

Because this frequency would be too low for accurate evaluation of the low frequency response of the coil, a higher frequency, maybe 200 cycles could be used to check the low frequency wave shape. Just remember the high or low wave shape you will be looking at is high or low compared to the fundamental test frequency.

There is a limitation to the usage of higher frequencies in square wave testing. Because of the fact that the rise time of the leading edge of the square wave is determined by very high frequencies compared to the fundamental, it becomes impossible to get square waves through cable pairs, filters or other components which have a capacitance which will absorb these high frequencies.

Thus, a piece of apparatus or a line which will show a good square wave at up to 1,000 cycles at fundamental frequency, may not pass a square wave of any kind at even a slight rise to 1,500 cycles.

For this reason, the square wave generator cannot be considered as a substitute for a sine wave generator when it is desired to transmit frequencies throughout the entire voice range of a telephone system. However the square wave generator will tell nearly as much about the transmission qualities of a system with one setting and one reading as a sine wave generator will tell with several readings.

Visual Form

Further, because the presentation is in visual, graphic form, it is easier to understand at a glance than it is to evaluate a string of figures taken from voltmeter readings made with a sine wave generator.

Following completion of several experiments on telephone carrier, repeater and straight voice circuits, a few checks were made on the Heathkit square wave generator itself.

The waveform put out by this instrument was very good. The generator contained internal adjustments which permitted calibrating it to the 60-cycle line, and which also allowed shaping of the wave. The generator was tested against, and used with a Hickok Model 770 oscilloscope.

This is a laboratory grade scope, which permits external connections direct to the deflection plates. The square wave generator wave was connected to these plates for calibration and excellent results were obtained.

The output of the generator was then measured with a Hewlett-Packard vacuum tube voltmeter which was also of laboratory grade. The Heathkit generator was measured on each of its ranges of 10-100 cycles, 100-1,000 cycles, 1,000 to 10kc and 10kc to 100kc. Each scale was found to have very close to the same power output reading at the lower end, and each had a 2 db rise from the lowest to the highest frequency, on each scale.

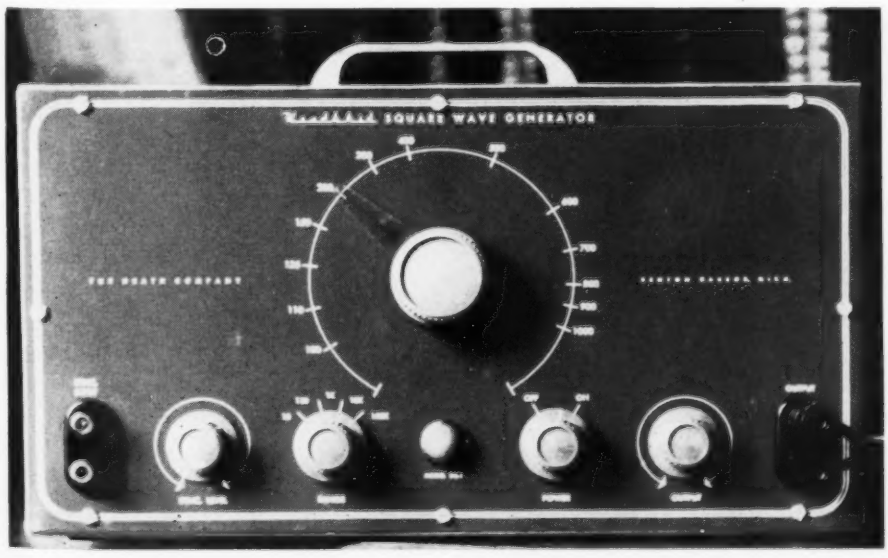
The highest range was about .5 db below the rest, which gave the instrument an over-all output power accuracy of 2.5 db. Tests were made of open circuit voltage and into a 600-ohm load. Maximum open circuit output was 25 volts; maximum into a 600-ohm load was 11 volts. The output is obtained from a 6V6 cathode follower. The cathode resistor is a 2,000-ohm potentiometer, which permits varying the output impedance and voltage.

The accuracy of the instrument may be considered as very good indeed, considering the fact that it is made from standard, wide tolerance, low-cost parts. Because of the manner in which a square wave generator is normally used, the slight variations as noted above are of no significance whatever.

Frequency

In the matter of frequency, the same logic might be expected to apply. Out of curiosity, the generator was frequently checked against a Hewlett-Packard 200CD oscillator on the low scales. It was found to deviate as much as 200 cycles in some places. Particularly noticeable was the fact that if a given frequency, say 1,000 cycles, was compared on two scales of the Heathkit, the frequencies were not exactly the same.

This is to be expected as the fre-



The Heathkit square wave generator is a professional looking instrument which produced good results in telephone work. (Photo by Louis Landman.)

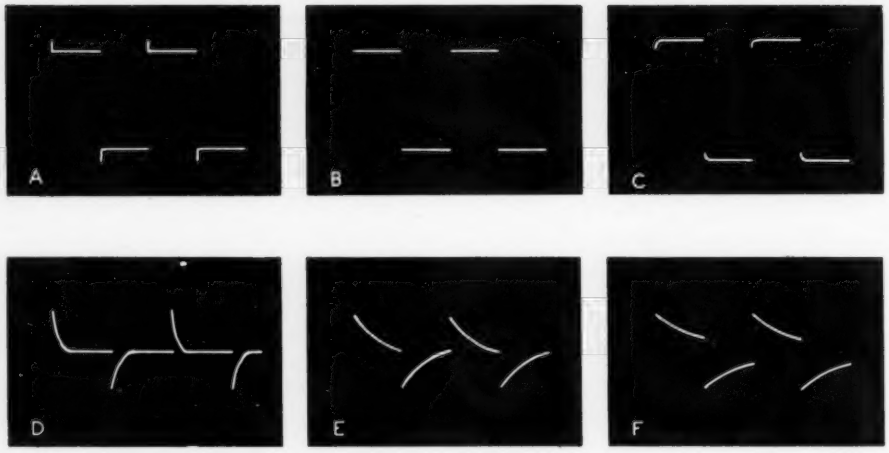


Fig. 3. Under some conditions, only a vestige of a square wave may appear on the oscilloscope. In all of the above the rise time of the vertical line is so steep that it cannot be seen. A: The high frequency response is excessive, as evidenced by the spikes or pips. B: The pip is absent here showing a more normal high frequency response. C: The slight rounding means a slight loss of highs. D: The horizontal line, meaning the low frequencies, is present, but it is at the zero voltage point. This means the fundamental frequency of the square wave generator and frequencies below it are not being passed. E and F show successively greater low frequency improvement. Leading edge of D, E and F are up, signifying that high frequencies are being handled in all cases. (Drawn from the presentation on a Hickok oscilloscope.)

quency of each range is determined by ordinary inexpensive radio-type condensers, which have a wide manufacturers tolerance.

Greater accuracy probably could be obtained at increased cost by using precision components. However, again this would be an unnecessary refinement in a square wave generator, where it is the wave shape that counts, not the exact frequency or power.

It should be pointed out that when the generator is lined up as directed and tested against the 60-cycle line frequency, it becomes most accurate on the low frequency range, which is the only range that would be used in telephone work anyway.

The writer would welcome any comments and would like to hear of the experience of others in the use of the oscilloscope in telephone work. If you have any tricks of your own that would help others, will you please let us know?

Also, how about the subject of do-it-yourself instrument kits? Several companies now make impedance bridges, vacuum tube voltmeters, oscilloscopes and other test gear than can be used in telephone work. Would you like us to test out a few of these and see if they are good enough for the kind of work we do? Write and tell us. Address your letter to Electronics Editor, TELEPHONY, 608 S. Dearborn St., Chicago 5, Ill.

If you desire more information on the material contained in these articles, here are some of the references.

"Test Scope Traces" a book by John F. Rider, price $2.40. This is full of pictures and explanations of different traces seen on the oscilloscope. You can buy this from TELEPHONY.

"Heathkits for 1957" a catalog containing description, use and circuit diagrams for a number of instruments available in kit form. TELEPHONY will refer requests for this catalog to the Heath Co.

"The Oscillograph" published by the Hickok Electrical Instrument Co. Price $1.00. TELEPHONY will forward requests for this book to the Hickok Company.

"The Oscilloscope—How it Works," and "How the Transformer Affects Wave Shape," both by L. N. Martin. These appeared in the Jan. 19 and Feb. 15, 1957 issues of TELEPHONY. These articles contained important facts on wave forms and on the operation of the oscilloscope which will greatly assist in an understanding of this instrument and its applications.

(The End)

Education and Freedom

"Education makes a people easy to lead, but difficult to drive; easy to govern, but impossible to enslave."—HENRY BROUGHAM AND VAUX, in *The Present State of the Law*, 1828.

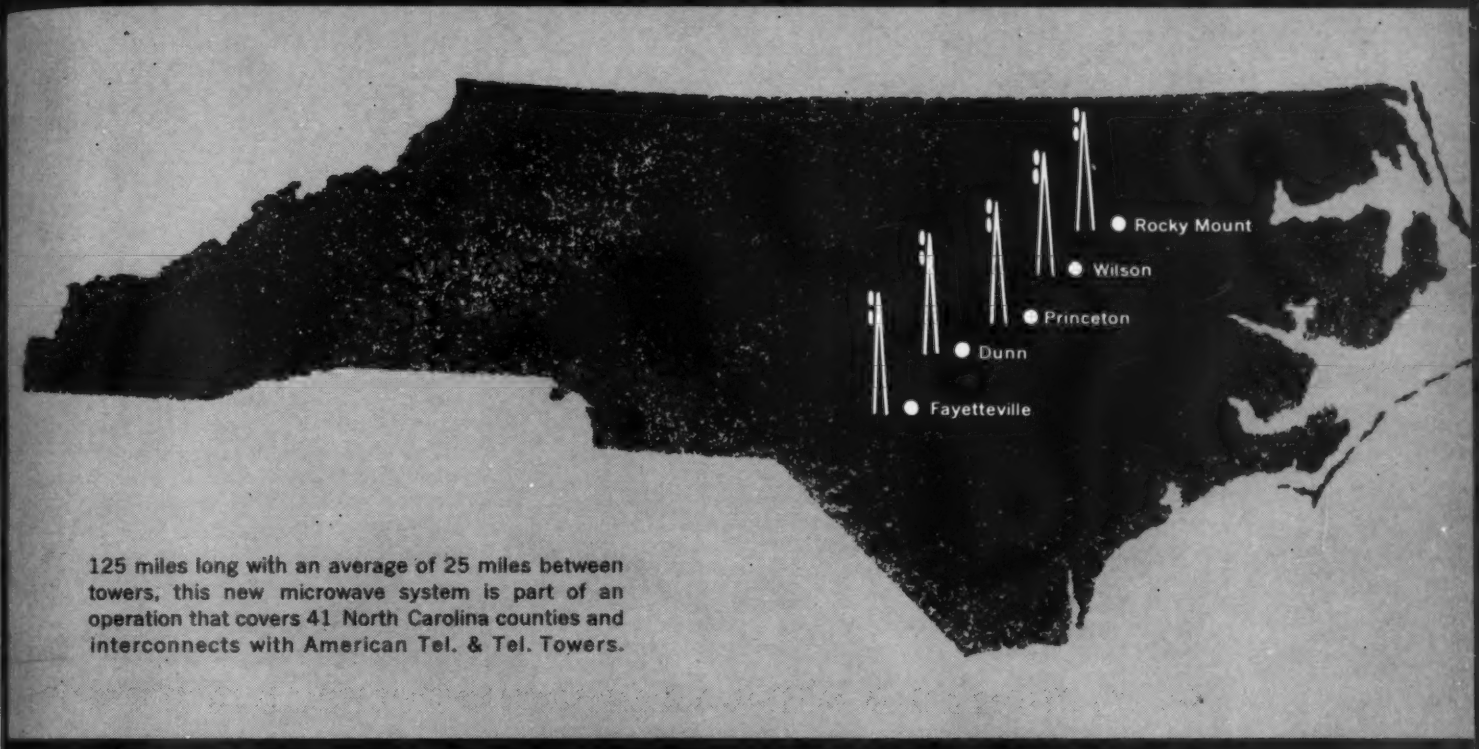
Universal Understanding

"God grant that not only the love of liberty but a thorough knowledge of the rights of man may pervade all the nations of the earth, so that a philosopher may set his foot anywhere on its surface and say: 'This is my country.' "—BENJAMIN FRANKLIN.

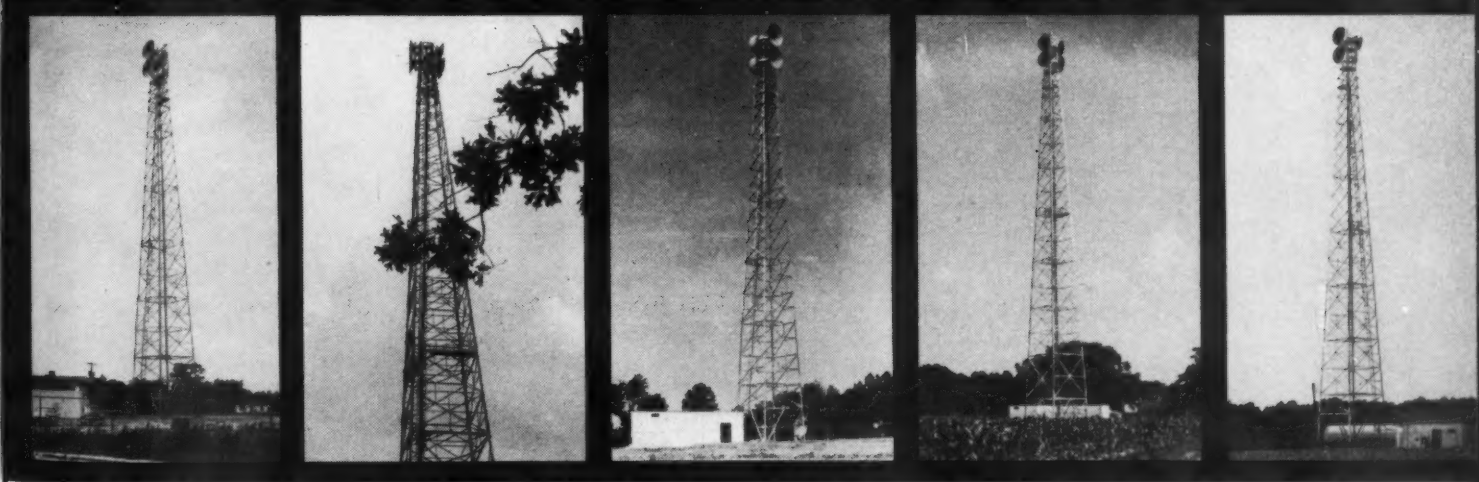
Mich. Gov. Mennen Williams signs proclamation naming Sept. 8 to 14 as Independent Telephone Week. Left to right: K. B. Sage of Central Lake; T. A. Saunders of Muskegon; L. W. Reynolds of Ontonagan; F. B. Twigg of Lansing; J. R. Fox of Waldron; R. J. Schafer of Pinconning; Don Carlson of Morenci; C. R. Smith of Port Hope; John Sattler of Cedar.

XUM

Progressive telephone company expands microwave service with five more Blaw-Knox towers



125 miles long with an average of 25 miles between towers, this new microwave system is part of an operation that covers 41 North Carolina counties and interconnects with American Tel. & Tel. Towers.



Erected by the Radio Construction Company of Pittsburgh, these Blaw-Knox Microwave Towers range from 150 to 250 feet high, and are built to handle additional antennas as service is extended.

Carolina Telephone and Telegraph Company have just installed their second microwave system since 1954. The new five tower section simplifies future expansion and permits the addition of hundreds of circuits at diminishing circuit cost.

Constantly extending and improving customer service, this company has nearly tripled its services in ten years to now serve nearly 150,000 telephones.

Today, as in 1954, Blaw-Knox Microwave Towers provide the dependable structures needed in an area where hurricanes have occurred in recent years. Located in a section where wind velocities have reached 100 miles per hour, Blaw-Knox Towers help maintain continuous service necessary for good customer relations.

A microwave system may be the cost cutting answer to your own expansion plans. For details on Blaw-Knox tower engineering, design, fabrication and erection services, write for Microwave Tower Booklet 2538.

BLAW-KNOX

BLAW-KNOX COMPANY

Blaw-Knox Equipment Division
Pittsburgh 38, Pennsylvania

MICROWAVE TOWERS

Blaw-Knox builds guyed and self-supporting towers for Microwave, AM, FM, TV, Radar, Communications . . . Transmission Towers . . . Parabolic Antennas . . . Special Structures. All custom built to meet your requirements.

Courts and Commissions

Ohio Independent Granted Increase in Rates

Citizens Mutual Telephone Co. of McClure, O., serving approximately 412 stations, was recently granted a rate increase by the Ohio Public Utilities Commission.

In the record of the case, it was found that the rate base (reproduction cost new less depreciation) was $72,146.46. Under the new rates and charges, the company's income available for fixed charges is $3,389.39. The rate of return on the rate base amounts to 4.7 per cent. Previous and present rates are:

	Old	*New*
Business		
One-party	$4.00	$4.75
Multi-party rural	4.00	4.75
Residence		
One-party	3.00	3.75
Multi-party	2.00	2.75
Rural		
One-party	3.00	3.75
Ten-party	2.00	2.75

Minn. Commission Oks Raises; Independent Sale

The Minnesota Railroad & Warehouse Commission on Aug. 19 gave the Melrose Telephone Co. authority to change rates at its Eden Valley, Greenwald, Grey Eagle, Kimball, Melrose, Richmond, St. Martin and Watkins exchanges upon conversion to automatic operation. Upon completion, operating revenues are expected to rise from $163,091 to $237,764, while net income rises from $21,889 to $50,286, giving a return of 3.77 per cent on a 1.4 million dollar rate base. Upon completion of the project, the company will serve 1,575 local and 1,961 rural stations.

•

The commission on Aug. 19 also authorized a rate raise for the Central Telephone Co. at its Welcome exchange, following conversion to automatic, for which more than 419 of the present 442 subscribers have petitioned. Under the new rates, operating revenues are expected to rise from $23,942 to $27,974, while net income rises from $4,070 to $5,780, producing a 5.07 per cent return on a net book cost of property which, including material and supplies, will be $114,116. The present magneto, and approved rates for dial at Welcome are:

	Old	*New*
One-party business	$5.60	$6.10
Two-party business	4.85	5.35
Rural multi-party business	4.75	5.25
One-party residence	4.00	4.25
Two-party residence	3.35	3.60
Four-party residence	2.80	—
Rural multi-party residence	3.70	3.95

•

The commission on Aug. 5 gave approval to the Northwestern Bell Telephone Co. to purchase all of the property of the Wilder Rural Telephone Co., a service line company serving approximately 111 stations.

C&P Requests EAS and Rate Raise in Maryland

Maryland's Public Service Commission was asked on Aug. 15 by the Chesapeake & Potomac Telephone Co. to approve a plan involving higher basic monthly rates, but providing wider-range telephone service.

The company estimated the plan would increase annual company net revenues by about $3,200,000.

The plan would also allow telephone calls without extra charges among any of the 75 exchanges and 600,000 telephones within the Greater Baltimore area.

The company estimated this would eliminate more than 19 million toll and extra message unit charges from customer bills annually.

SB T&T Asks Emergency Raise in Louisiana

An application for an immediate emergency increase in intrastate telephone rates was filed with the Louisiana Public Service Commission on Aug. 14 by Southern Bell Telephone & Telegraph Co. (TELEPHONY, April 13, p. 35).

Claiming in its application that 7 million dollars in additional gross annual revenue is needed, the company declared that "present earnings seriously threaten further telephone progress and development in Louisiana."

The company said its current rate of return of 4.24 per cent is "far less than a fair or reasonable rate of return" and therefore makes it difficult if not impossible for the company to attract capital to meet current demands in the state for telephone service.

Pacific T&T Asks Increase In Washington Rates

An application for higher telephone rates in all areas it serves in the state was filed by the Pacific Telephone & Telegraph Co. with the Washington Public Service Commission on Aug. 14.

The company estimated that the increases would produce $7,375,000 in additional revenue, before taxes. The net revenue after taxes would be $3,350,000.

Michigan Independent Effects Dial Rates

The Banfield Telephone Co. on Aug. 17 cut over its 430-station exchange from manual to automatic operation and at the same time effected the following rate schedule approved by the Michigan Public Service Commission:

	Residence	*Business*
One-party	$4.50	$6.75
Two-party	—	5.50
Four-party	4.00	—
Rural	3.75	4.50

Paystation, local calls, 10 cents.

Extended area service is now provided to adjacent exchanges at Delton, Hickory Corners and Lacey.

The cut-over marked the culmination of a $120,000 program which included a new exchange building housing switching equipment and the business office; installation of 100 lines of Kellogg Crossbar equipment, all new K-500 telephones and substantial additions to both local and toll outside plant facilities.

Toll cable facilities are jointly owned with Michigan Bell Telephone Co. and

XUM

are equipped with Kellogg negative impedance voice frequency repeaters.

Ill. Commerce Commission Grants Raises, Financing

The Illinois Commerce Commission recently took the following actions:

Approved the petition of the Grafton Telephone Co. for sale of $22,000 of common and preferred stock and to issue $82,000 in first mortgage notes, payable to Stromberg-Carlson, a division of General Dynamics Corp. The proceeds are to be used for construction, extension and improvement.

The Port Byron Telephone Co. on July 16 was granted a $20,172.25 rate raise, producing a 3.3 per cent return on a fair value rate base of $345,000.

The Galva Telephone Co. on July 16 was granted a $16,697 rate raise, allowing a 6.1 per cent return on a net original cost rate base of $268,238.50.

The Midland Telephone Co. on July 17 was granted permission to sell 201 shares of common stock.

Mountain States Requests Raise in Montana Rates

The Mountain States Telephone & Telegraph Co., pointing to continuing increases in the costs of providing service, on Aug. 7 asked the Montana Board of Railroad Commissioners for a readjustment of telephone rates in Montana, it was reported.

K. P. Todd, Montana vice president and general manager of the company, said the present rates—in effect for the past four years—are producing earnings below those required to keep the business financially sound.

At the company's Dillon exchange, rate raises would be as follows: One-party residence from $4.00 to $5.50; two-party residence from $3.25 to $4.50; one-party business from $8.75 to $11; and rural residence within 6 miles) from $3.00 to $4.00.

OK Sale in Missouri

General Telephone Co. of Missouri, Columbia, was authorized by the Missouri Public Service Commission to sell its telephone properties near Stewartsville and Osborn to the Inter-County Telephone Co. of Gallatin, it was reported on Aug. 16.

Seeks Rate Raise in Tenn.

Tennessee Railroad & Public Utilities Commission on Aug. 22 was to have held a hearing on the rate increase petition filed by Cities Telephone Co., Inc., Chapel Hill.

General of Missouri to Serve Ashland Exchange

The Missouri Public Service Commission on Aug. 21 found that it would be in the public interest to allow General Telephone Co. of Missouri, Columbia, to extend its lines into the area which has been served by the Ashland Telephone Switchboard Co., a mutual.

The commission noted that it has no power to tell a mutual exchange how to operate. But it found that 369 Ashland subscribers would be willing to pay the higher Columbia rate to get service from General of Missouri and only 165 of the mutual subscribers preferred to continue their present arrangement at $1.25 a month.

Therefore, the commission concluded, it would be in the public interest to let General extend service to the Ashland area and charge the same rates as Columbia subscribers pay. The company said it could finish the construction job by the end of next year.

General of SE Prepares for Merger with Subsidiaries

General Telephone Co. of the Southeast, a subsidiary of the General Telephone Corporation, has offered to exchange its share of new 5.80 per cent cumulative preferred stock for outstanding preferred shares of four other telephone subsidiaries in connection with a proposed plan for merging the subsidiaries into the Southeast company.

The offer provides for an exchange of 92,120 shares of General Southeast 5.80 preferred on a share-for-share basis for outstanding preferred of Durham Telephone Co., South Carolina Continental Telephone Co., Southern Continental Telephone Co. (Tennessee properties) and Georgia Continental Telephone Co.

Rate, Sale and Financing Actions Taken in Alabama

Monroeville Telephone Co., Inc., recently was authorized by the Alabama Public Service Commission to do the following:

Purchase the Beatrice Telephone Co. and The Pine Apple Telephone Co. from M. M. Kennedy.

Borrow $412,000 additional from the Rural Electrification Administration.

Place in effect dial rates upon certain conversions to automatic.

Issue $65,000 of common stock.

•

The commission also approved the sale by W. Hopper of the Hopper Telephone Co., Altoona, to Wilber L. Hopper.

•

Also granted was permission to the Coosa Valley Telephone Co., Inc., to borrow $275,000 from the Stromberg-Carlson Co., a division of General Dynamics Corp.

Ohio Independent Requests Increase in Rates

The Warren Telephone Co., which has three exchanges serving 35,000 customers on Aug. 6 asked the Ohio Public Utilities Commission for permission to raise its rates by $76,319 a month.

The company says it is faced with "continuously mounting expenses" and needs more revenue to meet them and provide services for new customers and improve service to present ones.

The company proposes to double rates of residence subscribers in Warren, it was reported.

17 States To Date Proclaim National Telephone Week

The governors of eight more states have proclaimed the week of Sept. 8 to 14 as Independent Telephone Week. The recent additions to the growing roster of states so honoring the Independent industry are: Arkansas, Colorado, Illinois, Kentucky, Louisiana, Michigan, Vermont and Washington.

States previously announcing such proclamations are: Florida, Indiana, Maryland, Missouri, Ohio, Oklahoma, Tennessee, Minnesota and Nebraska.

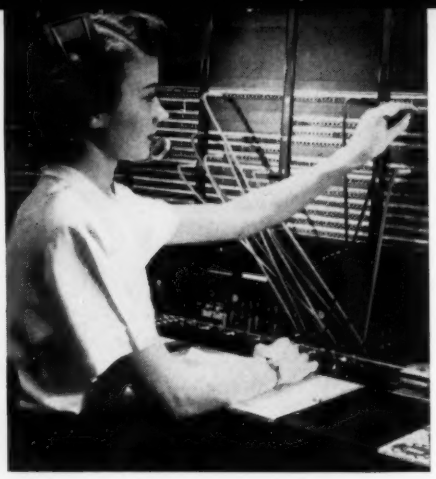
In addition, the governor of Alaska on Aug. 15 proclaimed the week of Aug. 25-31 as Independent Telephone Week. It is believed that this week was chosen (instead of the one observed in the U. S.) to coincide with the Alaska Telephone Association convention held in Kodiak on Aug. 26-28.

The Vital Force

"Failures always overtake those who have the power to do, without the will to act, and who need that essential quality in life, energy."—JAMES ELLIS.

To Entice Money

"Money moves to the place where profits are good and safety is assured. If it moves from the United States to Puerto Rico or Canada or anywhere, it means that there one can make a profit and the money is safe."—GEORGE E. SOKOLSKY, *columnist.*



THE Operator's Corner

By MAYME WORKMAN — TRAFFIC EDITOR

WHILE SOME COMPANIES, including telephone companies, now give vacations the year around, summertime is still the preferred vacation time for the majority.

Vacation in one form or another is a very necessary part of life. The bow must at times be unbent if the bowstring is to keep its full strength. It would be imprudent to allow the mind no relaxation and recreation. As you plan your vacation, it is wise to be mindful of these three cautions.

(1) Don't make it too strenuous. It is unwise to go so far away that more than half your time will be spent in fatiguing travel, rushing to a far distant destination under great pressure, and then having to turn around almost immediately and come back home. Tension in an automobile breeds accidents.

If you lead a sedentary life for the rest of the year, you cannot do yourself any good by a vacation that is filled with nothing but strenuous exercise, such as climbing mountains, playing tennis, swimming or hiking for hours each day. It is a mistake to overburden your ever-faithful heart.

In planning a vacation, adequate time should be allowed for relaxing and sleeping. The purpose of a vacation is to restore and build up one's energies, not to tear them down.

(2) Don't make yourself a pauper by the cost of a vacation.

Don't go deeply in debt for the sake of a special kind of a vacation.

Don't think you cannot relax and enjoy yourself without spending more money than you can actually afford.

Don't spend money for a vacation that will result in your being deprived of necessities or normal recreation later on.

(3) Take a few books along. There may be rainy days when you are forced to remain indoors, and this is an excellent opportunity to relax and get caught up on your reading. A quiet period of reading can do much to relax the mind and induce the calm that a good vacation should bring.

By observing these cautions, your vacation will be what it should be; a time to restore your zest and vigour for the tasks of life.

Today, employes in many fields, including the telephone industry, are enjoying longer "paid vacations" than ever before. This enables the vacationer to take a more extended trip, a more leisurely one, and have a little time left before returning to the job. This is important, too. This being true, we do not wish to live up to the old adage, "I'm glad to get back on the job to rest up after my vacation."

If you are spending your vacation at the seashore or at a lake, remember the necessary precautions to avoid sunburn. If you take too much sun at one time, you not only invite the painful sunburn which may result from your action, but you may become very ill, too. This illness is most disturbing and may ruin your vacation.

If you camp in the woods, be careful of fires. Be sure to put them out before leaving.

Take along a few first aid items, especially if you are far removed from a location where you may obtain them.

Forget about the job, relax and have fun.

A vacation is like a prolonged rest period, or coffee break. Telephone companies, and many other companies, provide these breaks for their employes to give them an opportunity to relax and have a few moments of leisure for personal use. These breaks result in less confusion and result in the employe doing a better job upon returning to duty. A vacation does the same thing on a larger scale.

There are still a few people who look down their noses and frown on vacations, but thank goodness, we do not find these individuals in the Telephone Industry.

Vacations are allotted on a length of service basis and employes who have been with the company for a prolonged period of time are rewarded for their loyal and faithful service by being given additional vacation time. Perhaps these employes also need a longer rest period after having worked for many years.

Vacations are wonderful. Let us not only enjoy them, but appreciate them as well since they are given to us, "for free." This has not always been the rule. In days gone by, people worked year in and year out, without an interlude of rest and recreation, and many more hours per day and week. We are living in a wonderful era, despite our many problems.

Traffic Questions

(1) What classes of service are furnished on Mobile Service Calls?

(2) Please define "General Mobile Service."

(3) On what basis are mobile calls within the local service area accepted?

(4) How are MS calls outside the local service area accepted?

(5) Please explain "Dispatching Mobile Service."

Answers are presented on page 51.

Three Telephone Companies Incorporated in Kentucky

The following telephone companies were recently reported as incorporated in Kentucky:

Pulaski County Telephone Co., Somerset, and Rockcastle Telephone Co., London, by E. Gaines Davis Jr. of Frankfort.

The Lewisport Telephone Co., incorporated in Owensboro, by L. M. Wilson of Louisville.

The Uncertain Element

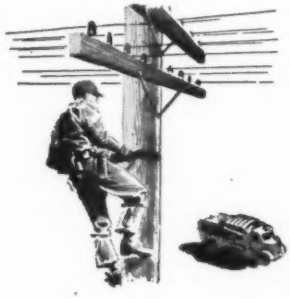
"Chance is always powerful; let your hook always be cast. In a pool where you least expect it there will be a fish." —OVID.

XUM

Being interviewed is W. C. Dunn, Supervisor of Industrial Laboratories

"We've been waiting 21 years for this battery to wear out"

At the Exide Laboratories—**Reporter:** Has this battery been on test all that time, Mr. Dunn?



Dunn: Yes, it's been subjected to a continuous float life test typical of the kind of use it would get in most applications. And you can see for yourself just how little sediment there is on the bottom of the jar.

Reporter: What does that indicate?

Dunn: It means that most of the active material is still locked in the spiral lead buttons unique with Exide-Manchex Batteries.

Reporter: Do today's Exide-Manchex Batteries have the same long life potential?

Dunn: Even better. Because the batteries made today incorporate significant improvements in materials and construction that assure even greater length of service and better performance than these batteries were ever capable of before.

Reporter: What do these advantages mean to battery users?

Dunn: Greater economy and more dependability—the two qualities that have made Exide-Manchex Batteries world famous for years.

Note to battery users: Whenever you order batteries for float or cycle service in stationary applications, be sure to specify Exide-Manchex. Write for detailed bulletin. Exide Industrial Division, The Electric Storage Battery Company, Phila. 2, Pa.

THE ELECTRIC STORAGE BATTERY COMPANY Exide®

construction and maintenance DIGEST

- **Power assured**
- **Weather-scoffer**
- **Country-style thrift**
- **Profitable noise**

Published regularly to help you get the most out of your materials and supplies dollar

by Gerald C. Gaydos, Inside Sales—Chicago

In my spare time I like to do crossword puzzles, but there's never any puzzle about the advantages of ordering supplies from Stromberg-Carlson. No matter where you're located, you're protected by a double guarantee on the fine products you order from Stromberg-Carlson . . . ours, and the maker's. This way, when emergencies make special demands—you're not alone. You find **two** solid companies right beside you, eager to help. That's how our 62-year reputation in the industry has grown. That's why it pays you to order from Stromberg-Carlson—leader in the research for new and better telephone equipment. We'd like you to know we appreciate your support.

Insure your power supply

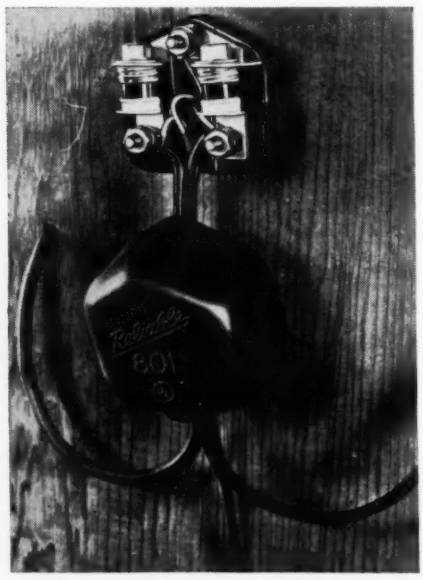
Because Planté batteries practically last forever...providing stand-by power that never fails...they're the best operating insurance you can buy. In switchgear, signal and alarm systems, or emergency light and power applications, these lead batteries have rolled up amazing performance records . . . are famous for their ability to deliver a powerful surge or a steady flow of current the instant it's needed. Make sure you're in operation . . . always. Choose Gould Planté.

Ask your Stromberg-Carlson representative about long-life stand-by power with Gould Planté.

A sure, dependable supply of power when you need it. That, briefly, is the story of this Gould Planté battery.

Long life under all conditions

You get long service life under all kinds of weather conditions with the Series 800 Fuseless Protector, recently developed by Reliable Electric Company.



Easy to install and maintain

This new protector is available with Reliable No. 504 Protector Units (as No. 801) for station protection and with Reliable No. 506 Protector Units (as No. 801A) for cable protection.

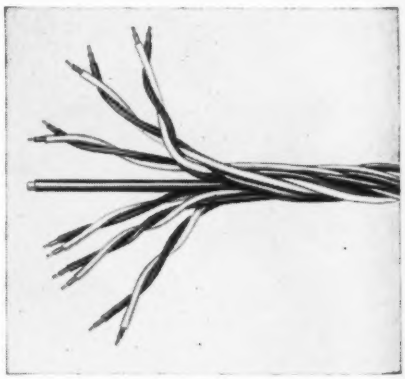
The weather-tight neoprene cover has passed the Underwriters Laboratories severe requirements for performance and weathering under temperature extremes. The protector is listed under UL Re-examination Service.

The neoprene cover fits snugly and drops out of the way conveniently when protector is installed or serviced.

Your Stromberg-Carlson representative can offer prompt delivery on your order.

Rural Distribution Wire Gives Speed Plus Economy

For fast, low cost construction specify Ansonia Lightweight Rural Distribution Wire.



Ankoseal Rural Distribution Wire Ideal for Temporary Service or Cable Relief

It comes with plastic-insulated #19 A. W. G. soft copper conductors in color-coded pairs, which are cabled around a polyethylene-insulated .109 high strength galvanized steel support wire. Each conductor pair has a controlled different length twist to avoid cross-talk.

A breaking strength of 1800 pounds makes this Ansonia Wire & Cable Company product ideal for temporary service or cable relief.

Your Stromberg-Carlson representative can offer prompt delivery on your order.

XUM

Noise can be money!

Take a business subscriber who has a telephone in some extremely noisy location—and who has finally decided to do something about it. Would you rather have him spend money in building a soundproofed booth—or give you the money as monthly income on a telephone which completely licks the noise problem?

The GAI-PHONE is such an instrument. It has a special transmitter that actually creates a "Zone of Quiet" around the handset—even in a spot as noisy as a boiler factory! It costs the subscriber less than a

booth—and you get the revenue! Ask us for complete details.

Did you know . . . that Stromberg-Carlson warehouses and handles thousands of items in the field of construction and maintenance supplies alone? You can do *all* your business "under one roof" and find the same quality and reliability in every item.

Distributed by

STROMBERG-CARLSON

A DIVISION OF GENERAL DYNAMICS CORPORATION

Sales Offices: Atlanta 6, Chicago 6, Kansas City 8, Rochester 3, San Francisco

IN THE NATION'S CAPITAL

Concluded from page 19

operating in a state where the return is kept at a subnormal rate do not attract investors. As a result, such utilities must pay abnormally high cost for new capital to carry on and expand operations. This, of course, adds to the cost of operation, unnecessarily creating a vicious circle which can only be broken ultimately by either granting higher rates in the end, or putting the company on the rocks.

Just by way of comparison, the financial editor of *Public Utilities Fortnightly*, Owen Ely, in the current issue of that publication makes a comparison of cost of capital based on common stock financing and average 1956 return on investment for four states, two of which are generally regarded as strict and two of which are reputed as more liberal in return allowance. He finds the average return on investment about 5.5 per cent in the two strict states (New York and California) and 7.6 per cent in the two more liberal states (Florida and Texas). Ely does this by a table (see box on page 19) which he explains as follows:

"Common stock financing is the big variable in cost of capital. (The cost of senior (bond) money is much less affected by regulation, being determined almost entirely by the individual utility's capital structure and the ratings assigned the new security by the financial services.) The earnings-price (E-P) ratio, the reciprocal of the more familiar price-earnings ratio, is the basic factor in cost of equity financing, whether the latter is achieved by use of rights or by straight sale of stock. Of course, the figure, to be accurate, has to be adjusted (see this department, Cost of Capital—a New Formula, Aug. 29 issue), however, for comparative purposes the E-P ratio figures seem adequate.

"We find that, as of recent date, the E-P figures averaged about 7.3 per cent for the strict states, compared with 5.4 per cent for the more favorable states—almost the reverse of the rates of return allowed. Thus, the current cost of equity financing would be 35 per cent higher in the former states, largely as the result of regulatory factors. Certainly the rapid growth in sales is not a governing factor, for California utilities are outstanding in this respect."

The rate of return works out about 38 per cent higher in the two states enjoying more liberal regulation. Despite a relatively higher return on investment in Texas, residential electric rates in that state are about 11 per cent lower than in New York State. This might be explained in part by the low cost of natural gas fuel.

Reviews on Three New Electronic Books

THERE ARE many men working as technicians for telephone companies or as radio repairman or in other complex trades who have only a superficial or perhaps it can be called an empirical knowledge of the things they work with. A man can be trained to fix any kind of a gadget, but he won't be able to fix the next improved model of the gadget unless he is retrained, or unless he knows the fundamentals.

Training texts are not always the answer to this because a book that is too basic may be boring. Therefore, it is with interest that we have reviewed some of the Rider books on electronic technology. These paper back books are designed for use in adult education and vocational schools.

They are unique in that each book covers a single subject. The reader, then, can learn the things he needs to know, and learn them upward from the underlying principles, so that he becomes mentally prepared to extend his understanding to new things as he meets them.

As these books are issued, they will be reviewed in TELEPHONY.

"ANTENNAS," edited by Alexander Schure, Ph. D. 76 pages, illustrated. Paper-bound, $1.50.

This is a new volume in the Rider series of Electronic Technology books. It bears the number 166-14 in this series. This is a book of fundamentals on a single subject. It develops antenna theory as an extension of transmission line theory, and in this respect alone contains information that telephone men can apply to their own lines.

Current and voltage relations, standing waves and phase considerations are explained in a swift, efficient style with many simple illustrations. After basic principles are firmly established, it is then shown how gain and di-

COTTON
Serviceable for all around uses. Standard everywhere.
NYLON
Smooth texture, easy to handle. Preferred for switchboard use.
NEOPRENE
Very popular because easy to keep clean. Moisture and grease proof.

Runzel

CORDS

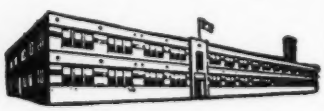
the WORLD'S FINEST

...for every purpose!
...for every instrument!

Take your choice—Neoprene, Nylon or Cotton. They're all high quality cords made in accordance with Runzel high standard of quality. We carry large stocks of cords to meet every need. Our geographical location means Quick Service.

RUNZEL CORD & WIRE CO.

4723 W. MONTROSE AVE. • CHICAGO 41, ILLINOIS



rectivity are built into antenna systems. A wide assortment of specific types of antennas and feeding and matching methods are illustrated and explained.

This book will be very useful to anyone concerned with radio or microwave systems. In addition it will be of interest to anyone who is interested in what happens when electricity flows over wires.

While emphasis is on practical down-to-earth explanations of how transmission occurs, the appropriate mathematical formulae are included for those who may have use for them. These formulae, however are not part of the explanations. Rather it might be said that they result naturally from the development of the theories as outlined in the book.

Buy this book from TELEPHONY.

•

"WAVE PROPAGATION," by Alexander Schure. 64 pages, paper back. $1.25.

This book is No. 11 in a series of volumes on electronic technology. It is tersely written and tells a great deal in few pages. Dealing with electromagnetic waves, it explains the different kinds such as ground waves and sky waves. A surprisingly complete discussion is given of the ionosphere and the various layers which propagate radio waves over great distances.

It is fully up-to-date and gives full details of the recently developed scatter propagation by which high frequency radio is sent beyond the horizon. The book also discusses the diffraction techniques by which radio beams bend over obstructions. Several diagrams are used to show the practical application of the facts in the text.

It will take but little of one's time and money to read this book, but it contains valuable basic knowledge for anyone interested in radio and microwave-systems.

You can get it from TELEPHONY.

•

"ENERGY" by Sir Oliver Lodge F.R.S. Paper, 64 pages. $1.50.

This is a modernized version of a book first published in 1929. Sir Oliver was a philosopher as well as a physicist and this abridged version of his text only brings the physics up to date; it loses none of the author's charm. Although the book explains such things as the laws of motion and thermodynamics, the language is as formal and pleasant as a chat with an old friend.

The modernization became necessary because man's understanding of nature has changed some since the first atom bomb was fired. The revision omits obsolete material and adds several illustrations of everday objects — a clock pendulum, a cannon, a streetcar and an airplane—to illustrate different laws of physics. If you have forgotten your high school physics, this book is a good way to refresh your memory on some branches of the subject.

You can buy this book from TELEPHONY.

Reviews by Harold McKay.

Obituaries

Lester W. Carmichael, who completed almost 40 years of service with Automatic Electric Co., on Aug. 7 died of a heart attack. Mr. Carmichael, who joined the company in 1919, served in production, purchasing and statisti-

L. W. CARMICHAEL

cal capacities before being promoted to division sales manager for the north central states area in 1939.

Assigned to production control during the war years, he resumed his sales manager position in 1946. In 1953, he was named supervisor of Automatic Electric Sales Corp.'s statistical analysis group and held that position at the time of his death.

•

NICHOLAS M. KISCHITZ, a staff engineer with the Telephone Engineering Division, Rural Electrification Administration, suffered fatal injuries in an auto accident near Waynesboro, Va., on Aug. 16.

Mr. Kischitz, who was graduated from the University of New Hampshire in 1949 with a degree in electrical engineering, came to REA as an engineering trainee in 1950. Upon completion of training he was assigned to

XUM

the Telephone Engineering Division where he specialized in the field of voice transmission.

The deceased is survived by his parents, Mr. and Mrs. George Kischitz of Newport, N. H., and a brother of Niagara Falls, N. Y.

Individualism Plus Teamwork American Way, McHugh Says

Keith S. McHugh, president of the New York Telephone Co., took sharp issue on Aug. 2 with some of the concepts expressed recently by William H. Whyte, and others. Mr. Whyte's book "The Organization Man" has been a recent best seller.

In a talk to more than 60 corporation presidents and other executives attending an American Management Association course at Colgate University, Hamilton, N. Y., Mr. McHugh disagreed with the view that current business organization life tends to stifle individual initiative and makes a virtue of conformity. "Certainly the rugged individual of our early industrial society has literally disappeared and there is a considerably greater emphasis on teamwork and the advantages of working together and pooling ideas. But to conclude from this that individualism within the team is dead or dying in America is really nonsense," the telephone president said.

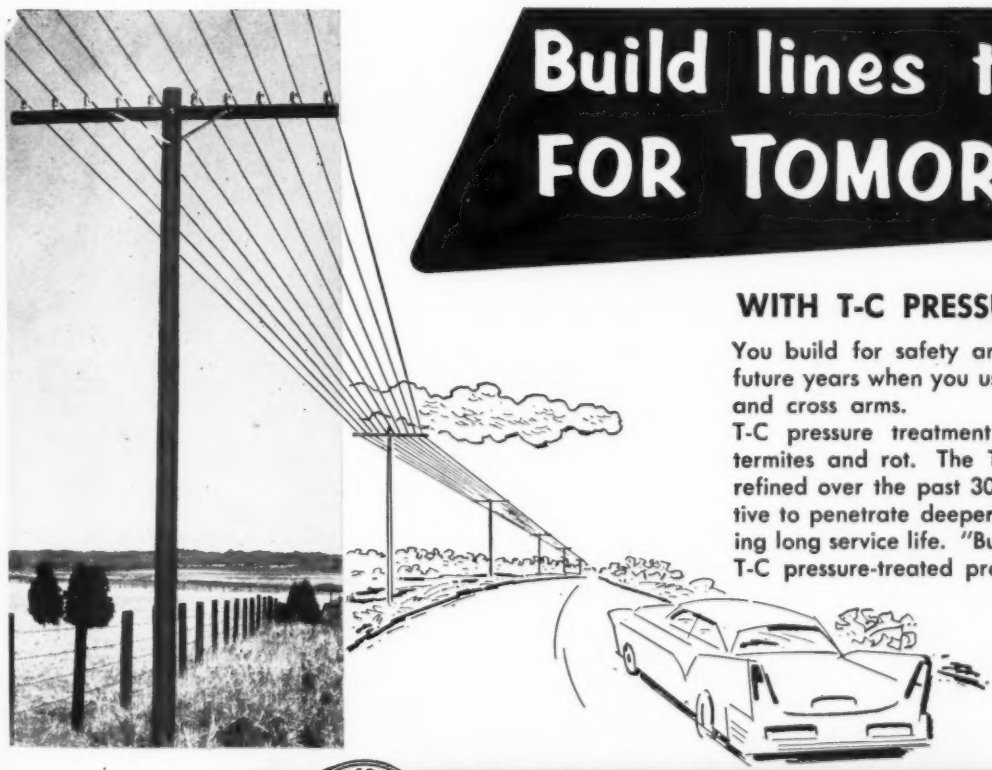
Mr. McHugh said that "the remarkable and continuing economic development of our country over the past decade . . . could never have been attained without hundreds of thousands of instances of initiative in business organizations." He added that the need for industrial initiative and innovation in business will be even greater in the future if we are to maintain or increase our present pace of technological and economic development."

The New York Telephone Co. will need 10,300 new management people over the next 10 years—or a little over 1,000 a year, he pointed out. Most of these will be promoted from nonmanagement jobs within the company, he said, adding that the company is particularly interested in recruiting people from the top 25 per cent of high school graduates in New York State who do not go to college.

Mr. McHugh denied that the individual tends to be "submerged" in a large organization. "I have been working now for the Bell System for 38 years, and believe it or not, my soul has been my own throughout that whole period." He added that what some critics really seem to be arguing for is an American industrial organization like that of the 18th century when every man was his own boss and each his own entrepreneur. "That system would no doubt produce some very rugged and nonconforming individuals," he said, "but I doubt seriously that it would produce the America we know today or anything approaching it."

Discussing ways and means for developing the management team in business, Mr. McHugh said that while he knew not everyone would agree with him, he was personally skeptical of the value of sending management people back to school to study the arts, social sciences, and philosophy. "I can find no evidence thus far which makes me believe that several months off the job as a student of the arts makes either a better leader or a happier man," he said.

The telephone president said there was adequate opportunity for the individual to indulge his interests in the arts and social sciences on his own time. He expressed the view that the best business leaders could be developed through work on the job and through job related training.



Build lines today...
FOR TOMORROW

WITH T-C PRESSURE-TREATED POLES

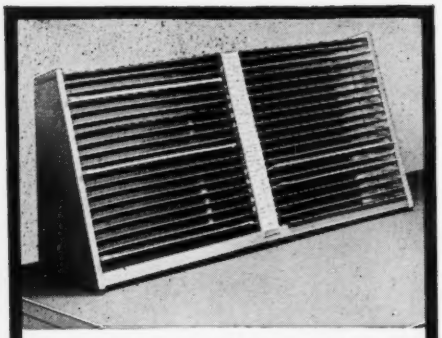
You build for safety and minimum maintenance in future years when you use T-C pressure-treated poles and cross arms.
T-C pressure treatment is sure protection against termites and rot. The T-C process, developed and refined over the past 30 years permits the preservative to penetrate deeper and more uniform — assuring long service life. "Build for Tomorrow . . . specify T-C pressure-treated protection.

Distributed by
AUTOMATIC ELECTRIC SALES CORP.
AND LEICH SALES CORP.

TAYLOR-COLQUITT CO. TIMBER CONSERVATION T-C

TAYLOR - COLQUITT CO.
SPARTANBURG, SOUTH CAROLINA

PLANTS AT SPARTANBURG, SOUTH CAROLINA AND WILMINGTON, NORTH CAROLINA



Trouble Recorder Card Rack

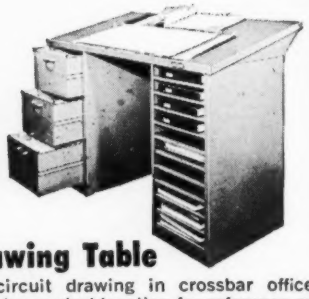
For fast orderly sorting of Trouble-Recorder cards, has 38 card slots in two banks with index strip between. Base is 38" by 8". Height 15". No. D30225-1.

Telephone Office Equipment

to lighten your work and improve efficiency

Work Bench

For repair, assembly, test and paper work. Top drawer divided into 24 compartments for parts and tools. Large file drawers are for circuit drawings. 54" x 25" top covered with masonite. Height 36". Drawers may be inserted from back to reverse position of kneehole. No. D29978-3.



Drawing Table

For circuit drawing in crossbar offices, provides central location for reference material. Masonite top is 30" x 60". Height 36" at front, 42" at rear. Three large file drawers at left for drawings. Eleven shelves at right are 2½" high, 14" wide, 18" deep for sketches, sequence charts, book type SD sheets, trunk serials, etc. No. D30326-1.

Color of all units: Baked-on gray enamel unless otherwise specified.

TWIN POST
Neubauer
MANUFACTURING CO.
517 LOWRY AVENUE N.E.
MINNEAPOLIS 18, MINN.

Little Miss Kathryn Marie Howard, elder granddaughter of L. W. Hill, unveiled the portrait of her grandfather during recent ceremonies in which Mr. Hill's portrait was presented to Carolina Telephone & Telegraph Co.

Portrait of L. W. Hill Presented to Carolina T&T

A portrait of L. W. Hill has taken its place on the wall of the board of directors' room of Carolina Telephone & Telegraph Co. in Tarboro, along with the four other past presidents of the company.

Mr. Hill was elevated to chairman of the board of directors of the company last May 17 after serving 12 years as president of the company.

In brief ceremonies on Aug. 9, Mrs. Kathryn Hill Howard, daughter of the former president, speaking for Mrs. Hill and other members of the family, presented the portrait to the board of directors and the company. Henry T. Clark, who has served longer than any other member of the board of directors, accepted the portrait with warm words of praise for Mr. Hill who was president of the company during the period of its greatest development.

Little Miss Kathryn Marie Howard, elder granddaughter of Mr. and Mrs. Hill, participated in the ceremony by unveiling the portrait.

Born in Darlington, S. C., Mr. Hill began his telephone career in 1916 with Southern Bell Telephone & Telegraph Co. In 1943 he joined Carolina Telephone & Telegraph Co. as its operating vice president, a position he held until elected president of the company in 1945.

The presentation preceded the regular meeting of the board of directors and was attended, in addition to board members, by Mrs. L. W. Hill, Romaine Howard, Sr., Romaine Howard, Jr., Ruth Howard and officers of the company.

Perpetual Aim

"The telephony company's aim has always been to provide the best possible service at the lowest possible cost. That is our objective today."—J. D. PORTER, *assistant vice president of revenue requirements*, Southern Bell Telephone & Telegraph Co.

Three Pamphlets Offered By National Safety Council

Hand soldering and brazing—one of the oldest and most common industrial operations—presents hazards many workers and do-it-yourselfers are unfamiliar with.

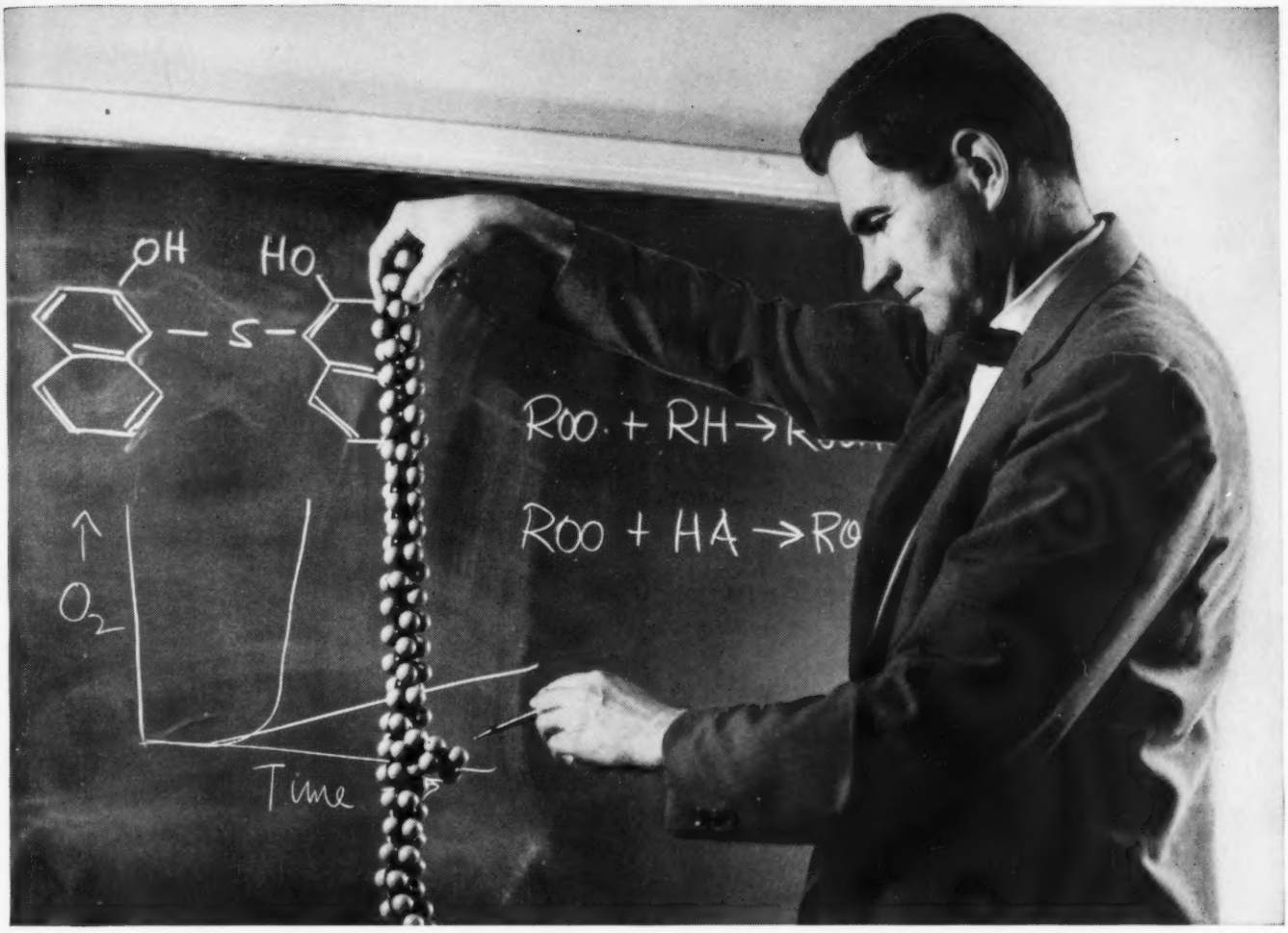
That's the warning of the National Safety Council, which points out that if conditions or practices in hand soldering and brazing aren't controlled properly, many hazards may result. These include lead poisoning, burns, dermatitis, fire and irritation from fluxes (fusion-promoting substances).

General information on the subject is given in recent Council data sheet D-445, "Hand Soldering and Brazing." Reviewed by safety engineers—all experts in the field—the seven-page publication presents up-to-date information that may be applied in both industry and the home.

The booklet notes that use of gas-heated soldering irons presents a greater lead hazard, usually, than electric irons, since larger amounts of solder are heated. Other possible dangers of gas-heated irons are exposure to carbon monoxide from poor combustion, and gas poisoning from leaks.

The greatest health hazards with solders are created by cadmium, zinc, antimony and fluorides. Care should be taken to prevent ingestion of such toxic materials and breathing fumes containing them. For this reason, lunches should not be eaten or stored near soldering operations.

The council data sheet further



Bell Laboratories chemist Field H. Winslow, Ph.D., Cornell University, with a scale model of a small section of a polyethylene molecule. Branch formation indicated by pencil is vulnerable to oxidation. Dr. Winslow and his associates worked out a simple way to protect long polyethylene molecules needed for durable cable sheathing.

THE DILEMMA OF GIANT MOLECULES

Solution: 2 plus 2 equals 5

Polyethylene is used to protect thousands of miles of telephone cables. It is tough, light and long lasting. Its strength lies in its giant molecules—a thousand times bigger, for example, than those of its brittle chemical cousin, paraffin wax.

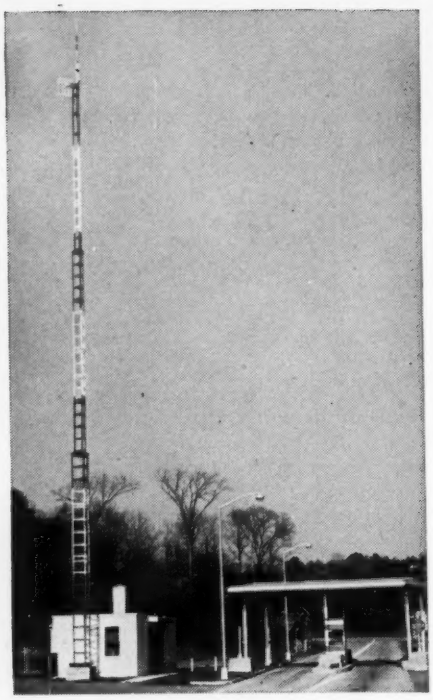
But polyethylene has a powerful enemy: oxidation, energized by light and heat, shatters its huge molecules to pieces. This enemy had to be conquered if polyethylene was to meet the rigorous demands of cable sheathing. Paradoxically, it was done by making the whole better than the sum of its parts—just as though 2 plus 2 could be made to add up to 5.

To check the ravages of light, Bell Laboratories chemists devised the simple yet highly effective remedy of adding a tiny dose of carbon black. Then antioxidants, such as those commonly used to protect rubber, were added to check attack by heat. But here the chemists encountered a dilemma: although the carbon black protected against the effects of light, it critically weakened the effectiveness of the antioxidants.

To solve this dilemma, Bell Labs chemists developed entirely new types of antioxidants—compounds not weakened by carbon black but which, intriguingly, are very much more effective when carbon black is present. The new antioxidants, plus carbon black, in partnership, provide long-lasting cable sheath—another example of how research at Bell Telephone Laboratories works to improve your telephone service.

BELL TELEPHONE LABORATORIES

WORLD CENTER OF COMMUNICATIONS RESEARCH AND DEVELOPMENT



Communication's Most Versatile Tower . . . the STAINLESS "SC" (Self-Supporting)

- Clean, economical, dependable structure
- Serves many purposes
- Space-saving uniform cross-section
- Easy to erect
- "Natural ladder" construction affords easy maintenance

Quick, expeditious handling of communications is assured year-'round by this clean, economical and dependable self-supporting structure.

The SC Tower is sturdy, and being free of guy cables is particularly adaptable where land space is at a premium.

Available as straight uniform cross-section for short heights, graduated uniform cross-sections for taller use.

Call or write for details.

Stainless, inc.
NORTH WALES • PENNSYLVANIA

stresses the importance of good (that is, continuous, not occasional) housekeeping. "What may be considered good housekeeping in other kinds of work may be poor or only fair when applied to soldering operations," it reports.

Briefly, here are suggestions it gives for proper safety control in soldering operations:

(1) Prevent ingestion of toxic materials. Good personal hygiene is a necessity.

(2) Workers should be given annual physical examinations.

(3) Protective clothing should be worn.

(4) Equipment should be maintained and soldering areas kept clean.

(5) Precautions should be taken to prevent fires.

Although the data sheet's suggestions are geared to large industrial soldering operations, many of the tips are applicable on smaller jobs or even in the home workshop.

•

Take care of "Your 10 Best Tools" —avoid injury to fingers and hands.

That's the advice the council imparts in a new eight-page cartoon-illustrated pamphlet. Splinters, careless use of equipment, machinery and solvents—they're all potential destroyers of fingers or hands.

Further information and prices may be obtained from the council.

•

The tumbles of clowns are amusing to circus-goers, but falls in a home are anything but laughable.

Jocko the Clown is the "story-teller" in a recent National Safety Council pamphlet, "Home Tumbles Are No Circus."

The publication points out the safety hazards for would-be home repairman, the man who gropes in the dark, the lady who can't see over the top of a load.

Small fry, too, come in for consideration. "They don't recognize danger," Jocko says. "Put bars across low windows and fasten screens securely."

A sample copy and information on quantity prices may be obtained from the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill.

Are We Wasting America's Most Important Asset?

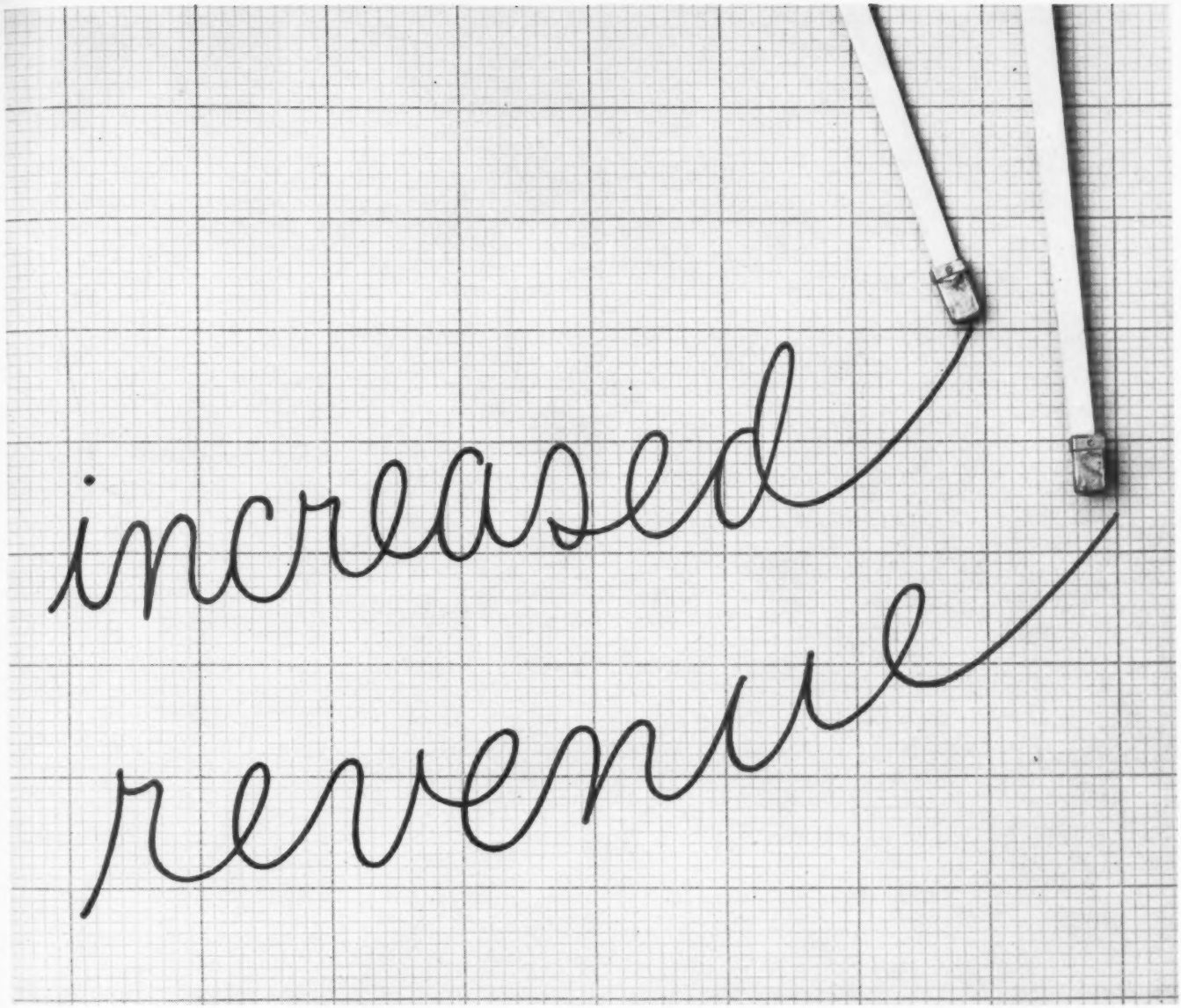
"This country has a wasting asset—and, while it is a non-material asset, it is the most precious we possess," points out *Industrial News Review.* Its name is character, and in its decline we face the rapid deterioration of America. That sombre theme is powerfully argued by William Henry Chamberlin, writing in the July 13 issue of *National Review.*

"Mr. Chamberlin points out that material wealth, in which we abound, may be deceptive. Great and rich empires of the past—such as the Roman and the Byzantine—'proved far gone in decay when put to the test of unexpected crisis.' Their resources seemed all but limitless, yet they were overcome and destroyed by barbarian tribes. We can and do point to all manner of achievements in wages, production and consumption, and so on. But there are other records which point in a very different and ominous direction. One of them is crime. Mr. Chamberlin quotes J. Edgar Hoover as saying that over 2,500,000 major crimes were committed in the United States last year—an all-time high figure. And an appalling percentage is committed by juveniles.

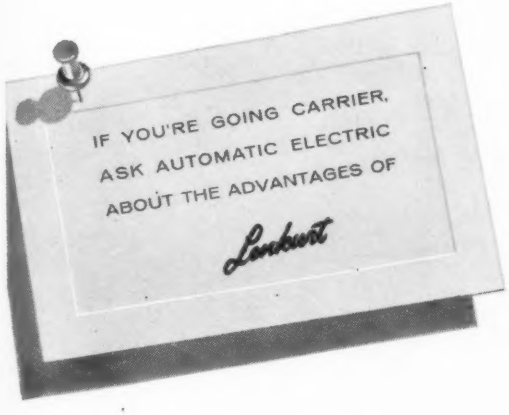
"He then makes an interesting and significant commentary on the crime problem. It has long been argued that the seeds of crime lie in poverty and want. But no country in history, probably, has suffered as little poverty and want as we do now. Employment is at or near peak levels and wages are very high. Vast sums of money have been spent on slum clearance and on housing. Poverty, as it is known abroad, has all but disappeared here. Yet the crime rates soar—which, in Mr. Chamberlin's view, means that 'the whole comforting environmentalist theory that crime is a result not of bad people but of bad conditions has been disproved.'

"These crime rates are not the only danger signs. We have, he feels, gone far along the road of the welfare state —and far away from the philosophy laid down by President Cleveland when he said that the people should support the government, but the government should not support the people. There has been a serious weakening of individual responsibility—and thus a serious increase in moral irresponsibility.

"Mr. Chamberlin is convinced that this has in large part resulted from the influence of two men. One is Marx, who called religion the opium of the people. As Mr. Chamberlin puts it, '. . . man in the Marxian formula is stripped of human dignitv and individuality. . . . There is no room . . . for the agonized struggle of the individual to achieve goodness and shun evil.' The other is Freud, the father of psychoanalysis. Freud believed that man's character 'is irresistibly shaped by instincts and urges which are be-



TELEMETERING...



Leasing circuits for TELEMETERING . . . one of the fast-growing new opportunities for you to get extra revenue. All over the United States, more and more circuits are being leased from operating telephone companies for the transmission of metered data (temperature, pressure, flow, etc.) to distant control points. *Who's in the market?* Pipelines, power companies, refineries, chemical processors, steel manufacturers, many others. *How can you add channels economically to tap new sources of revenue like this?* With Lenkurt Carrier, of course. Automatic Electric provides Lenkurt equipment in a complete, easy-to-own package—engineered, furnished and installed. Our engineers would be glad to help you; just drop us a line today. Automatic Electric Sales Corporation, Northlake, Illinois.

In Canada: Automatic Electric Sales (Canada) Ltd., Toronto. *Offices in principal cities.*

AUTOMATIC ELECTRIC

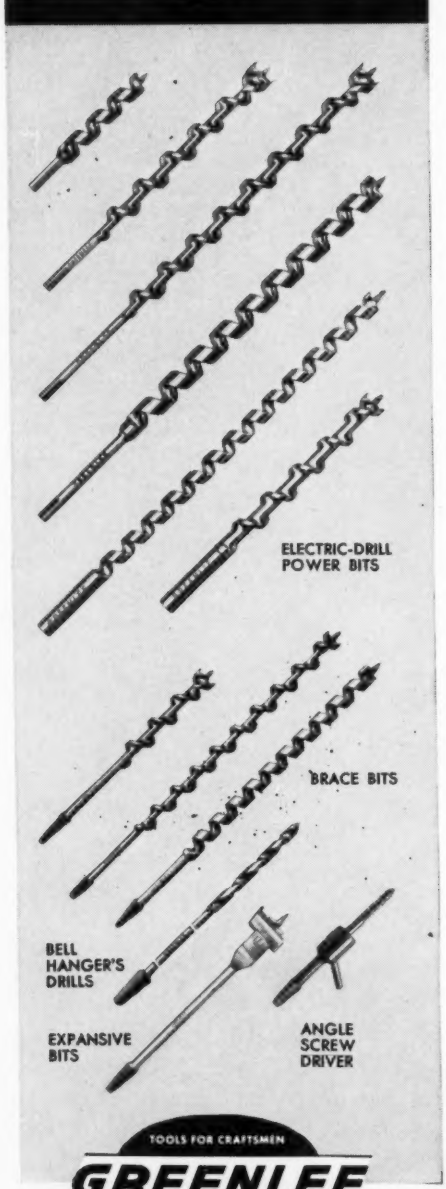
A member of the General Telephone System—
One of America's great communications systems

GENERAL TELEPHONE SYSTEM

high-quality, long-lived

BORING TOOLS

for pole, crossarm, and timber work . . .



TOOLS FOR CRAFTSMEN

GREENLEE

Whether you need to bore deep or shallow holes, small or large, there is a GREENLEE bit, drill, or auger for the job! Various lengths and styles for electric drill or hand-brace use. All of highest quality materials and correct design for easy boring, clean cutting, and long life under hard usage. Stocked by leading telephone supply distributors . . . see yours or write direct for literature.

Greenlee Tools Co., 2068 Columbia Ave., Rockford, Ill.

yond the control of reason and conscience.' The upshot of all this is that 'there is now a shamefaced, apologetic attitude toward the use of such words as virtue and vice, good and evil.'

"Mr. Chamberlin's thesis is that the one thing no nation can afford to lose is the individual character of its citizens. He writes in conclusion: 'To rescue the building of individual character from its present low estate . . . to make it a primary objective, is the searching challenge of the day to American homes, schools and religious communions.' "

General of Cal. Repairman Competes in Marathon Run

"A heart that is normal and beats slowly is a strong heart, doctors tell me," said Jack Guarino, General Telephone Co. of California repairman who competed in the Tenth Annual Western Hemisphere Marathon run in Culver City, Cal. on Aug. 3. "Roger Bannister, the Englishman who was the first runner to break the four-minute mile has that kind of a heart, too," he added.

Mr. Guarino matched his ability against top-notch amateurs from all over the country in the 26 mile 385 yard run.

Weighing 143 pounds and standing 5 feet 9 inches tall, he had been practicing every night after work and is a familiar figure on Bellflower Boulevard in Downey, Cal., where he runs from between 5 and 10 miles a night.

Guarino trained at Long Beach Cal. Junior College under Mel Patton, Co-holder of the world record for the 100-yard dash. He is a resident of Bellflower, Cal., and has been an employe of General since 1954.

The 1957 Western Hemisphere run was a district marathon championship run for the Southern Pacific Association of the Amateur Athletic Union and was held in conjunction with Culver City's fiesta.

Kellogg to Distribute Universal DDD Equipment

George T. Scharffenberger, president of Kellogg Switchboard & Supply Co., division of International Telephone & Telegraph Corp., and Donald O'Neil, president of Universal Controls Corp., of Dallas, Tex., subsidiary of Rauscher, Pierce & Co., Inc., Dallas investment bankers, announce the conclusion of arrangements whereby Kellogg will distribute the products of the Telephone Division of Universal Controls Corp.

Universal Controls manufactures applique equipment for modifying automatic switchboards to meet the requirements of the Direct Distance Dialing (DDD) program.

Universal products include code-to-selective ringing converters, digit absorber units, trunk digit register units

A dual role is played by Jack Guarino, 22, of Bellflower, Cal. who is a repairman for General Telephone Co. of California in Downey by day, (right photo) and a track runner by night. Guarino recently competed in the Tenth Annual Western Hemisphere Marathon Run in Culver City, Cal., matching his ability against top-notch amateurs from all over the country in the 26 mile 385 yard run.

XUM

and computer intercept apparatus. The equipment has been in development for the past three years, and all units have been field tested in automatic switchboard installations throughout the country. Only standard telephone components, largely of Kellogg manufacture, are used in simple, straightforward methods of application, according to the Kellogg company.

IT&T Elects J. T. Jackson Assistant Vice President

The election of John T. Jackson as assistant vice president of International Telephone & Telegraph Corp. was announced on Aug. 20 by Edmond H. Leavey, president. Mr. Jackson is director of the planning and organization department of IT&T.

A native of Milwaukee, Mr. Jackson graduated from Cornell University with the degree of B.B. in Administrative Engineering. Following graduation he was commissioned a Second Lieutenant in the Army of the U. S., where he served for four years, most of which time he was in the Pacific area. At the time of his release from military service, he had attained the rank of major.

Until November 1953, Mr. Jackson was with George S. Armstrong & Co., industrial engineers and management consultants. He joined IT&T's research

Answers to Questions On Page 40

(1) General Service and Dispatching Service.

(2) General Service is two-way communication between any wire telephone and a mobile unit suitably equipped, or between two mobile units. Calls are routed to the MS office through which the mobile unit is normally reached or to the MS office nearest to the known or assumed location of a mobile unit.

(3) Such calls are accepted only on a paid station basis with the exception of calls for or from trains which are accepted on either a paid person or station basis, local MS message charges applying in either case.

(4) Such calls are accepted on either a paid or collect station or person basis, the rate being the same.

(5) This is a two-way communication between a dispatching line and specific mobile telephones, involving only paid local service.

WITH LOW MAINTENANCE PBX

BY USI

Mighty few service calls to cut into profits when you install rugged PBX equipment built by United States Instrument. It performs for subscribers year after year with close to zero maintenance.

FEATURES YOU'LL LIKE:

Relays with long-lasting twin contacts of precious metal.

Compact rotary and rectangular motion switches with twin bifurcated wipers.

Expands in steps from 2 trunks—10 stations to 15 trunks—100 stations.

Parts delivery overnight to most points.

SUBSCRIBERS LIKE:

Busy—lamp field for at-a-glance check of stations in use.

Automatic station transfer of trunk calls.

Key senders dial automatically on larger systems.

Incoming calls stored and put through automatically.

Write today for our catalogs:

UNITED STATES INSTRUMENT CORPORATION

P.O. Box 33-T. Charlottesville. Virginia

ALPHADUCT
TELEPHONE WIRE
1000
lasts longer
costs less
ALPHADUCT DUMBBELL PARALLEL
DROP WIRE WITH NEOPRENE JACKET, No. 18 COPPERWELD CONDUCTORS
Now you can have the longest lasting, neatest drops you've ever strung . . . and at less cost too.
Alphaduct's dumbbell or figure eight construction provides the best protection for the conductors, and is the easiest to install of all the neoprene jacketed drop wires. The No. 18 Copperweld is 20% stronger than No. 17 bronze.
Alphaduct's tough neoprene jacket protects the insulation against sunlight, moisture, oil, acids, abrasion, etc. Each conductor has the same thickness of rubber insulation and neoprene jacketing as it does in twisted pair construction. The dumbbell shape permits splitting the wire without damage to insulation or neoprene jacket on either conductor.
Try this remarkable Alphaduct dumbbell drop wire. It's step-tested during manufacture, dated, so you can tell how long it lasts and carton packaged for your convenience and protection. Order today from the distributors listed below.
IT'S DATED • FOR YOUR CONVENIENCE AND PROTECTION
ALPHADUCT WIRE AND CABLE COMPANY

division, Federal Telecommunication Laboratories of Nutley, N. J., as administrative assistant to the president, heading the organization and methods planning office. In May 1956, Mr. Jackson was named assistant to the president of IT&T, with headquarters in New York, and appointed director of planning and organization in February, 1957.

Gould Names Regional Head For Industrial Division

The appointment of K. A. Vaughan as Northeastern regional manager for the industrial division has been announced by Gould-National Batteries, Inc., Trenton, N. J. In addition to his duties as export manager, Mr. Vaughan will supervise sales and service activities on the application of batteries in Maine, Vermont, New Hampshire, Rhode Island, Connecticut, and parts of New York and New Jersey.

Mr. Vaughan has been associated with Gould-National Batteries since 1928. He has worked in every department in the company and his experience includes six years in production and 16 years in field engineering, the last nine of which were in the capacity of manager of field engineering. He was appointed export manager last February.

Mr. Vaughan has written many articles pertaining to battery maintenance.

Bell Engineer Rates Award

A Bell Telephone Laboratories chemical engineer, William G. Pfann, will receive this year's Francis J. Clamer Medal from Philadelphia's Franklin Institute. He will be honored Oct. 16 for discovering and applying principles of "zone refining" to metals and other crystalline substances. Originally used to purify germanium for use in tran-

sistors, the technique has been extended to the purification of many types of semi-conductors.

C & D Batteries Creates New Research Division

A new division created to undertake basic research on storage batteries has been established by C & D Batteries, Inc., of Conshohocken, Pa. Headed by Dr. Eugene Willihnganz, well-known authority in the battery industry for the past 25 years, the new C & D Research Division will supplement the company's developmental laboratories.

DR. E. WILLIHNGANZ

In announcing establishment of the company's new research division, Henry E. Jensen, vice president in charge of engineering and marketing, explained:

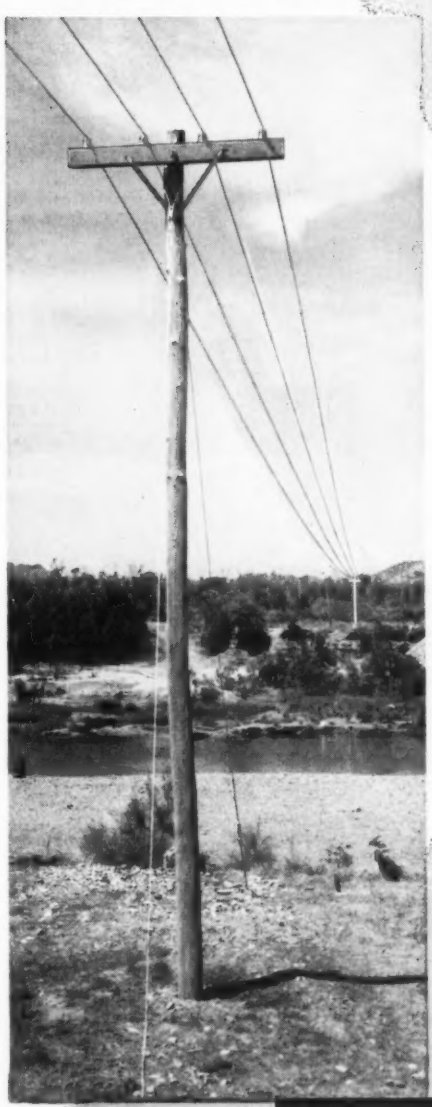
"We are building for the future. The primary purpose of the new division will be basic research.

"It will be equipped with the most modern scientific instrumentation for

Crapo HTL-195

FOR EXTRA LONG SPAN RURAL LINES

The *NEW* *LOWER* Resistance Extra-High Tensile Line Wire



- **Better Voice Transmission**
- **Spans to 600 Feet or More**
- **Savings in Material and Labor**
- **Lower Ultimate Costs**

Superior voice transmission qualities and extra high physical strength are combined in ***Crapo*** HTL-195 to provide the most practical and economical of conductors for rural telephone circuits.

This new, lower-resistance steel line wire, with a minimum breaking strength of 1800 pounds, makes possible spans to 600 feet in Heavy Loading, 650 feet in Medium Loading and 700 feet in Light Loading areas. Where terrain and other conditions permit the use of extra long spans, this means a 40% reduction in pole structures. The savings in materials and in construction costs will be apparent.

Before building new, or replacing old rural lines, investigate the possibilities of ***Crapo*** HTL-195! Write for complete information, including Manual of Engineering Data, No. A-195!

Pioneers in the development of high tensile and extra-high tensile steel line wire, and associated products, for the telephone industry.

INDIANA

STEEL & WIRE COMPANY, INC.
MUNCIE, INDIANA

HERE'S SAFETY—SERVICE

you can always depend on. For Klein tools and equipment are designed better for your jobs—made of the finest materials—individually tested and inspected. Look for the familiar Klein trade-mark—serving the electrical industry "since 1857."

ASK YOUR SUPPLIER

Foreign Distributor:

International Standard Electric Corp., New York

100 years of service to linemen, electricians and industry is back of this new Pocket Tool Guide No. 100. A copy will be sent to you on request, without obligation.

Mathias Klein & Sons
Established 1857 — Chicago, Ill., U.S.A.
7200 McCORMICK ROAD • CHICAGO 45, ILLINOIS

the basic study of the storage battery and its component parts. Even in its present state of advancement, it is still surrounded by many complex problems which, when solved, should bring forth many new advancements in storage batteries—further increases in capacity, higher efficiency, longer life, and lower unit cost."

Dr. Willihnganz assumes his new duties as C & D Batteries' director of research following a career of more than a quarter of a century devoted to basic research in the battery industry. His work on the theory of negative plate operation, and his method of measuring the electrical resistance of batteries, are known among battery engineers everywhere. A goodly proportion of the batteries built today directly or indirectly incorporate the results of Dr. Willihnganz's work somewhere in their construction, C & D states.

Confidence Is In Order

"We are on sound economic ground, based on sound economic principles, and there is no reason why we should not go forward unless confidence is badly injured or destroyed."—GEORGE M. HUMPHREY, *former Secretary of the Treasury.*

Public Relations View

"A corporation is a social institution in a social environment, and, try as they might to ignore the fact, those making its decisions will have relations with various publics, whether good or bad."—W. J. MCGILL, *general manager, industrial and public relations, Standard Oil Co. (Indiana).*

Robert L. Feistel has been appointed general sales manager in charge of export and domestic sales at Budelman Radio Corp. of Stamford, Conn., it has been announced by William E. Fingerle Jr., president.

TELE-MUFF Jr.

The Head Set Ear Cushion
Designed Especially for Switchboard Operators

Made of Soft Pliable Vinyl Foam

- **Easy on Ear**
- **Inexpensive**
- **Attractive**

Write for Details

Thanks for your splendid response. All orders being shipped promptly.

TELE-MUFF CO.
Box 832
San Fernando, Calif.

Automatic Volume Control Constant Output AMPLIFIER

Specifically designed for constant level amplification of telephone circuits. Prevents overloading of telephone lines and avoids loss of low level signals. Maintains constant output within ± 1 db with input changes of 30 db. Provided with a double scale meter and transfer switch to indicate degree of compression or output level. Exceedingly rapid automatic gain reduction time prevents syllable clipping. Slow automatic gain increase avoids automatic control at syllabic frequencies.

SPECIFICATIONS

RESPONSE (±1 db)	20 to 20,000 cps.
OUTPUT CONSTANCY	±1 db (30 db input change)
S/N RATIO	60 db
HUM AND NOISE	—60 dbm
INPUT IMPEDANCE	600 ohm c.t.
OUTPUT IMPEDANCE	600 ohm c.t.
LINE VOLTAGE	117 volts, 50/60 cycles
DIMENSIONS	19" x 7" x 8¾"

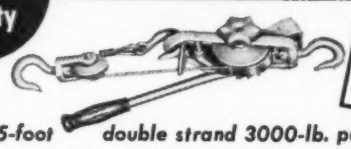
For complete technical specifications and direct factory prices write to Dept. T

AMPLIFIER CORP. of AMERICA
398 Broadway, N. Y. 13, N. Y.

XUM

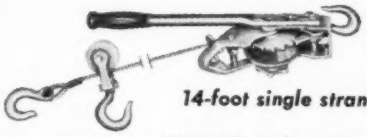
ACCO Quality

Wright Type "R" PULL-A-WAY



Write for Bulletin DH-163B

5-foot double strand 3000-lb. pull



14-foot single strand 1500-lb. pull

Weigh less than 9 pounds

Sturdy • Light • Safe • Economical

Here are some of the fine features of WRIGHT Type "R" Pull-A-Way: Drop forged ductile aluminum alloy frame • Wire hoist cable of maximum strength and flexibility • 8″ minimum handle movement—for close hook-ups • 2″ drum hub for cable • No oiling needed • Drop forged steel hooks • Removable, reversible "Safety Handle" that bends before any part of hoist is overloaded • Automatic load lowering, with positive control for safety • No slipping brakes • Low first cost • Simple, rugged repair parts easy to install ...factory service never required.

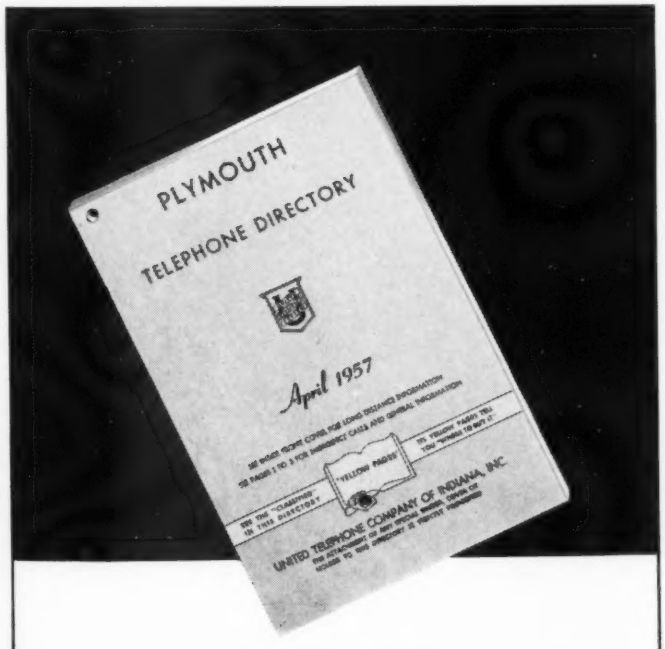
Write our York, Pa., Office for Bulletin DH-163B for full story

ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

for Better Values



A directory for the
United Telephone Company of Indiana, Inc.
printed by

R. R. DONNELLEY & SONS COMPANY

350 East Twenty-second Street, Chicago 16

In the Lifelines of Independent Telephony

SINCE 1897

...It's KENNECOTT Telephone Cable!

THE STORY of Independent Telephony is a story of growth and service. Ever since 1897, when the USITA was formed, Kennecott Wire & Cable has been a steady supplier to many of the 4400 member companies. On this, their 60th Anniversary, we congratulate America's Independent Telephone Companies on reaching a significant milestone. May the future be even brighter!

60 Years of Independent Telephony 1897-1957

INDEPENDENT

CHASE BRASS & COPPER CO., WATERBURY 20, CONN.
DISTRIBUTOR FOR

KENNECOTT WIRE & CABLE CO.

SUBSIDIARIES OF KENNECOTT COPPER CORPORATION

CHASE WAREHOUSES and OFFICES:

Atlanta	Cincinnati	Grand Rapids	Milwaukee	New Orleans	St. Louis
Baltimore	Cleveland	Houston	Minneapolis	Philadelphia	San Francisco
Boston	Dallas	Indianapolis	Newark	Pittsburgh	Seattle
Charlotte	Denver	Kansas City, Mo.	New York (Maspeth, L. I.)	Providence	Waterbury
Chicago	Detroit	Los Angeles		Rochester	

HALEY

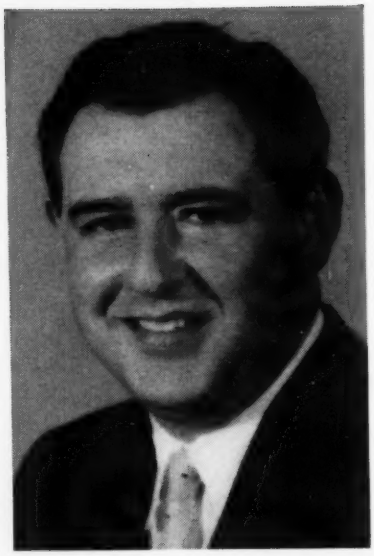
CEDAR POLES & FIR CROSS ARMS

Light in weight and clean. PENTAchlorophenol treated in our modern plant for protection against decay, moisture and insect damage.

TWO strategically located yards:
MINNEAPOLIS, MINNESOTA
FINDLAY, OHIO

R. G. HALEY & CO., Inc.
SPITZER BUILDING
TOLEDO 4, OHIO

IMMEDIATE DELIVERY



Paul P. Napp and George Stuart have been named to national headquarters' positions with Exide industrial division of The Electric Storage Battery Co., Philadelphia. Mr. Napp (left) becomes a market research analyst, while Mr. Stuart joins the advertising department to specialize in sales promotion activities.

Kellogg's Doubek to Head Central Office Equipment

George F. Doubek has been promoted to the position of manager of the Central Office Equipment Product Line, Kellogg Switchboard & Supply Co., Chicago, a division of International Telephone & Telegraph Corp., according to an announcement by George T. Scharffenberger, president. He succeeds Ned S. Underhill who has been appointed director of contract administration, Farnsworth Electronics Co., Fort Wayne, Ind., also an IT&T division.

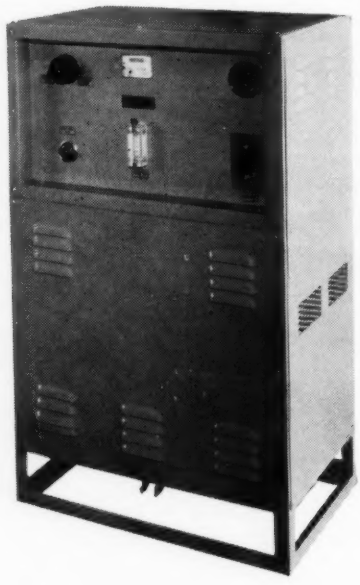
G. F. DOUBEK

In his new capacity, Mr. Doubek will have complete responsibility for engineering and manufacturing of Kellogg Crossbar, Relaymatic, Manual and Special Switching Apparatus. He has been with Kellogg since 1929, and his board experience with the company includes positions as manufacturing engineer, assistant chief inspector, assistant plant superintendent, and plant superintendent.

well worth investigating

S&G

MODEL A
Air Compressor Dehydrator



Exchange equipment designed to supply chemically dry air for telephone cables, aerial and underground, this unit can supply as many as 30 cables. The unit is equipped with volume recording air meter, high and low pressure alarm switches, humidstat and hour meter.

- Completely automatic in operation
- Air Purifier to eliminate oil mist
- Incorporates the latest safety devices

S & G MANUFACTURING CORPORATION
P. O. Box 1309 • New Orleans 10, La. • RAymond 3142

XUM

LOOK TO THE LEADER...

for
- RELIABILITY
- SERVICE
- NATIONALLY KNOWN TELEPHONE SUPPLIES

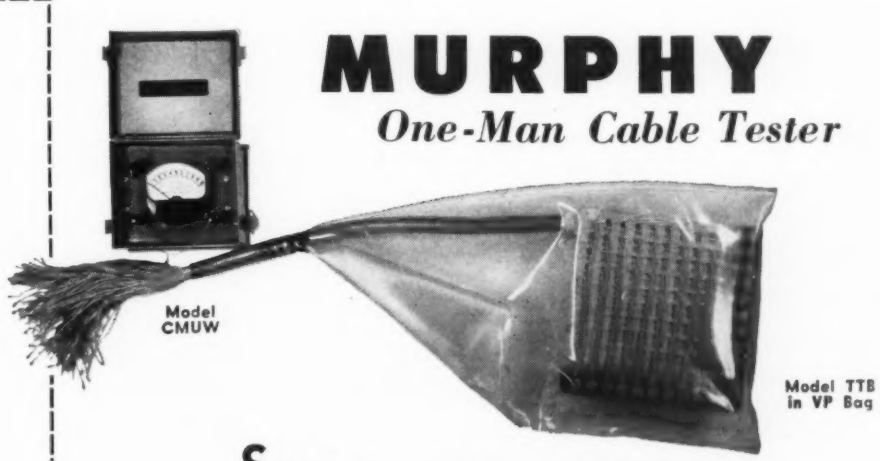
Prompt delivery of your order as specified is assured by Lindsay's fast, efficient, personalized service. Lindsay specializes in telephone supplies *only* . . . warehousing a complete line of the finest nationally known brands . . . your guarantee of the best as you want it . . . when you want it.

LOOK TO LINDSAY

THE LINDSAY TELEPHONE SUPPLY CO., *Est. 1939*
10409 Meech Ave., Cleveland 5, Ohio • Telephone Diamond 1-9212

One Man
Working Alone
Can Identify
Non-Working
Cable Pairs
3 Times Faster
Than 2 Men
Working Together
If He Uses
The Murphy
ONE-MAN
Cable Tester

MURPHY
One-Man Cable Tester



SAVE time . . . money . . . manpower with Murphy One-Man Cable Tester. Thousands are already in use by progressive telephone companies all over the world.

MANY NEW PRODUCTS IN DEVELOPMENT STAGE

Murphy Engineering Laboratories are working on a wide variety of new products that will help you save vital manhours. If you would like to keep informed about these products send your name and address to our office and we'll put you on our mailing list.

ELECTRONIC RESEARCH DEVELOPMENT MANUFACTURE

MURPHY ENGINEERING LABORATORIES, Inc.

OVerland 2-4000

4419 TULSA • HOUSTON, TEXAS

CABANISS-POGUE COMPANY
Consulting Engineers
Appraisals—Cost and Rate Studies
Financial Assistance
GRANT BLDG., ATLANTA, GEORGIA

CARL C. CRANE, INC.
Consulting Engineers
2702 Monroe Street, Madison 5, Wis
Telephone CEDAR 3-4210

McGRATH ENGINEERING, INC.
Consulting Engineers
209 West 6th Street
TOPEKA, KANSAS
Telephone 2-2358

SLOAN, COOK & LOWE
CONSULTING ENGINEERS
Appraisals—Original Cost Studies
Plant, Traffic and Commercial
Engineering
120 S. La Salle St.
Chicago 3, Ill. Tel.: FRanklin 2-8924

TUDOR AND YAGER, INC.
Telephone Construction
TIPTON, INDIANA
PHONE 125

YATES CONSTRUCTION CO.
"Specializing in Telephone Construction"
Cable Splicers, Telephone Installers, Equipment Installers, Construction crews.
1507 SOUTH SIXTH ST. PADUCAH, KY.
TELEPHONE 2-4623

CABLE SPLICERS • LINEMEN
STATION INSTALLERS
STEADY WORK, GOOD PAY
MIDWEST LOCATION.
The Weikel Line Company, Inc.
FORT WAYNE, IND.

Construction Crews Station Installers
Central Office Installations
Cable Splicers Complete Engineering
HENKELS & McCOY
6100 North 20th Street Philadelphia, Pa.
Now Operating in 30 States
OFFICES LOCATED AT
Elkhart, Indiana .....Tel. 2-5650
Ashland, Ohio .....Tel. 3-7543
Lansing, Michigan .....Tel. IV-5-7642
Springfield, Illinois .....Tel. 4-7360
Erie, Pennsylvania .....Tel. 2-4300
Sumter, South Carolina.....Tel. HO-9-3332
Ocala, Florida .....Tel. MA-9-1284
PERFORMANCE Has Built Our Business

Importance of People

"While there are problems of great magnitude always facing us, which challenge the very best that any of us can give, I have a hunch that we will always be fairly well equipped to make progress if we carefully select high-type employes, if we provide them with good training, encourage them to help themselves, and make fair provision for their security when their working days are done, because people are the important element of Peoples Gas."—JAMES F. OATES JR., *chairman of the board, The Peoples Gas Light & Coke Co.*

A Citizen's Duty

". . . the individual, in this self-governing Republic, can also simultaneously contribute to the anti-inflationary campaign . . . as a citizen and a voter. In this public rôle, the citizen, individually and collectively, can serve notice on members of Congress, of state legislatures, and of municipal bodies, to go easy in government spending.—M. S. RUKEYSER, *columnist.*

The Future of Education

"The more one considers the future of higher education in America, the more does one generate a concern regarding the need for improved communication between the world of scholarship and the world of affairs. Education includes the freedom to make mistakes and to learn to accept responsibility for them." — HAROLD WILLIS DODDS, *president, Princeton University.*

KILLOREN COMPANY
Construction crews—Installers
Cable Splicers
30 years experience
136 N. State St. Appleton, Wisconsin
REgent 3-5549

HARRIS-McBURNEY CO.
PUBLIC UTILITY CONSTRUCTION
A complete construction service for the telephone industry
Construction Crews Engineering
Station Installers Appraisals & Reports
Cable Splicers C. O. Installation
Underground Duct Systems
Telephone ST 4-6126
P. O. Box 267 Jackson, Michigan

INSPECTION SERVICE AT TIMBER TREATING PLANTS
Of poles, crossarms, and preservative treatments. Analyses of wood preservatives. Consulting and specification writing.
Inspectors stationed throughout U.S.A.
A.W.WILLIAMS INSPECTION CO., INC.
MOBILE, ALABAMA

ATLANTIC
Creosoting Co., Inc., 17 Battery Pl., N. Y. C.
Creosoted Pine Poles • Crossarms
PLANTS AND OFFICES
Boston, Mass. Portsmouth, Va.
New York, N. Y. Philadelphia, Pa.
Savannah, Ga.

L. D. McFARLAND COMPANY
Box 390 • Sandpoint, Idaho
WESTERN RED CEDAR, DOUGLAS FIR, WESTERN LARCH AND LODGEPOLE PINE. CREOSOTE AND PENTA BUTT OR FULL-LENGTH TREATED POLES.

CONROE CREOSOTING COMPANY
P. O. BOX 109
CONROE, TEXAS
Pressure Treated Southern Yellow Pine Crossarms and Poles
Prompt Service Given Small Orders As Well As Large Ones

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

Cascade Pole Co., P.O. Box 743, Tacoma, Wash. — Creosoted Douglas Fir and Cedar Poles.

C. M. Christiansen Co.—Northern White Cedar Poles. Pentachlorophenol treated. Plant and Yards, Phelps, Wis.

Dierks Forests, Inc. (formerly Dierks Lumber & Coal Co.) Wood Preserving Division, 810 Whittington Ave., Hot Springs, Arkansas. Southern Pine select poles, all sizes and lengths, creosote and penta-pressure treated. Prompt shipment.

Eppinger & Russell Co., 80—8th Avenue, New York 11, N. Y.—Creosoted Poles and Cross Arms. Plants: Jacksonville, Fla., Norfolk, Va., Eddington, Pa.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants Beaumont and Texarkana, Texas.

International Paper Co., Long Bell Division, 926 Grand Ave., Kansas City, Mo. —Pressure-treated Southern Pine and Douglas Fir Poles. Creosote and Penta preservatives.

Montana Pole & Treating Plant—Box 2004, Butte, Montana. Penta-Pressure treated Lodgepole Pine and Western Larch Poles. Inquiries invited.

Texas Creosoting Company—512 Main Street, Orange, Texas—Creosoted Southern Yellow Pine and Douglas Fir Poles. Can also treat with "Penta."

CLASSIFIED SECTION

Rates 15 cents per word payable in advance. Minimum charge $3.00 for 20 words or less.
Classified advertisements must reach us 8 days before publication date.

HELP WANTED

DISTRICT MANAGER for Class A California Independent telephone company. Experienced in plant, traffic and commercial. Write Box No. 4005, c/o TELEPHONY.

CHIEF OPERATOR—familiar with intertoll dial, capable of supervising entire traffic department, Southern state. Write Box No. 4006, c/o TELEPHONY.

WANTED: Telephone Installers, Cable Splicers, Linemen, Central Office Installers. Yates Construction Company, 1507 South 6th St., Paducah, Kentucky. Telephone 2-4623.

SALESMAN wanted to travel midwest territory. Must be experienced. Should have good grounding in outside plant. Young company. Lots of opportunity for right man. Salary open. Include all particulars with reply. Write Box No. 4000, c/o TELEPHONY.

PLANT ENGINEERS for large Independent Telephone Company. Some experience necessary. In reply state age, educational and employment history. Address reply to Personnel Supervisor, Rochester Telephone Corporation, 10 Franklin Street, Rochester 4, N. Y.

MANAGER for expanding Cooperative Rural Telephone System. Must have administrative ability to direct all phases of telephone operations and develop sound expansion programs. Permanent position carrying substantial opportunity for qualified person. Replies confidential. Please write George Voss, president, West Central Telephone Association, P.O. Box 271, Wadena, Minn.

SALES REPRESENTATIVE to travel southern territory. Will handle well established product with limited competition. Must be able to talk to executives and engineers of both telephone and power companies and work with jobbers. Should have knowledge of up to date outside plant construction, also sales experience. Salary open. Include full resumé of education and experience with reply. Write Box No. 3999, c/o TELEPHONY.

MANAGER WANTED — Immediate employment to take over operations of recently converted system of three dial units serving 600 stations with 1,000 potential. Propose to add three additional units resulting in system total of 2,400 stations. Located west central Wisconsin along Mississippi river. Applicant must have substantial management experience in all phase of operations in systems of similar size. Please state basic qualifications and salary requirements in first inquiry. Address: Otto Harder, president, Vernon Telephone Cooperative, Viroqua, Wis.

TELEPHONE ENGINEERS

PHILCO

. . . has openings for

- OUTSIDE PLANT ENGINEERS
- INSIDE PLANT ENGINEERS

Age no barrier!

SALARIES
$8,000
to
$9,500
Per Year

Positions located OVERSEAS and in U.S.A.

You will find the pleasant, inspiring and challenging work you are seeking with PHILCO in the several interesting positions available in the United States and Overseas. Long range program.

Liberal employee benefits include: Free hospitalization, free life insurance, profit-sharing, retirement plan.

MUST BE U.S. CITIZEN

In order to assure a prompt interview please direct detailed resume to

PHILCO
TECHREP DIVISION
22nd & Lehigh Avenue
Philadelphia 32, Pa.

ALL REPLIES CONFIDENTIAL

HELP WANTED

CABLE SPLICERS, Station Installers, Equipment Installers, Linemen. Experienced men needed. Steady work, good pay. Henkels & McCoy, 1211 Kenmore Avenue, Elkhart, Indiana, or 6100 N. 20th St., Philadelphia, Pa.

WANTED
TELEPHONE ENGINEER
PLANT SUPERINTENDENT
For a growing telephone system in the Southeast. Must be familiar with all phases of telephone engineering. Send resume of education and experience to Box No. 4007, c/o TELEPHONY.

WANTED TO BUY

TELEPHONES—all types—any condition; candlesticks, wall sets, etc. Write advising quantities available. Our truck will pick up. Reply to Box No. 3952, c/o TELEPHONY.

MAGNETO TELEPHONES AND PARTS. Highest market prices. Write Telephone Company, Turtle Lake, Wisconsin.

WANTED TO BUY
TELEPHONE OPERATING COMPANY
Write: Box No. 3856, c/o TELEPHONY

SWITCHES FOR WESTERN ELECTRIC No. 740-A DIAL PABX SWITCHBOARD

13 Line Finder Switches per W.E. Drawing No. ED-66124-32G4.

13 Selector-Connector Switches per W.E. Drawing No. ED-66142-32G9.

9 Combination C.O. Trunks per W.E. Drawing No. D-66274-32G10.

These switches are practically new and in excellent condition. They would be ideal for expansion or replacement on your present equipment.

Whatever Your Needs . . . It Pays to Call BUTELCO First!

BUCKEYE TELEPHONE & SUPPLY CO.

Address Dept. "T"

1250 KINNEAR RD. HU 8-0655 COLUMBUS 21, OHIO

WANTED TO BUY

DESIRE TELEPHONE COMPANY of 300 or more stations. Will convert to dial. Send details to Box No. 4003, c/o TELEPHONY.

WE PAY $1.00 EACH for Western Electric Desk Stands; Candlesticks—brass type. Write Telephone Co., Turtle Lake, Wis.

INDEPENDENT TELEPHONE COMPANY will purchase other telephone companies having 2,000 stations or more. Any location. A mutually advantageous purchase agreement can be reached. Reply sending details to Box No. 4009 c/o TELEPHONY.

Private party will pay cash for all or part stock interest in telephone operating property 5,000 to 30,000 stations. Cash also available for conversions. Write Box No. 3953, c/o TELEPHONY.

POSITION WANTED

OUTSIDE PLANT ENGINEER desires to relocate. Excellent references, 17 years experience. Write Box No. 4008, c/o TELEPHONY.

EQUIPMENT ENGINEER, Plant Superintendent. Twelve years experience in all phases of central office equipment. Age 36. Write Box No. 4010, c/o TELEPHONY.

MANAGER—10 years experience at District level, six years plant and Signal Corps. Available after September 15, 1957. Write Box No. 4011, c/o TELEPHONY.

MANAGER or superintendent for small or medium size system. Experienced in R. E. A. and Independent operations. Married, age 38, with 16 years telephony experience. Can take complete charge. Detailed resumé upon request. Write Box No. 4004, c/o TELEPHONY.

FOR SALE

ILLINOIS BELL UTILITY trucks on ½-ton 49 Ford chassis—four to choose—Bodies by Highway Trailer. Price $425.00 each. GUTHRIE FORD, Sterling, Ill., Telephone 6300.

176 WE STRAIGHT-LINE RINGERS. Will fit 500 series WE or Kellogg telephones. Also a number of WE straight-line ringers for 302 WE sets. Fredericksburg & Wilderness Telephone Co., Chancellor, Va.

FIVE-POSITION OF 6-800 TYPE KELLOGG SWITCHBOARD, wired for 650 lines common battery, 50 lines magneto. Two voice repeaters. Two rectichargers 60 cycle 115 volt. 11 cell, one 3 amp., and one amp. Three rectichargers 60 cycle, 115 volt, 23 cell, one 2 amp. and two 1 amp. Two interrupters Kellogg 10A and 10D. Battery charger 60 cycle, 115 volt, 5 amp. Five A.C. dial trunks. One channel 5-F Kellogg toll carrier. Details will be furnished on request. Write Northwest Telephone Co., Redmond, Oregon.

FOR SALE

NORTH ELECTRIC COMPANY CX100. Good Condition. 100 lines, 15 links, 5 paystation adapters, 10—2 way dual function E and M signalling trunks, complete with battery rack, power board, charger, MDF and miscellaneous equipment. Reasonable price. Contact: T. J. Schuler, General Telephone Co. of Pa., 20 E. 10 St., Erie, Pa.

NORTH ELECTRIC CX-100 SWITCHBOARD available immediately. Fully equipped 100 lines, 13 links, excellent condition, 12 local 3 toll trunks, batteries, charger, main frame complete. Purchased new 1950. Will sacrifice. For further particulars write Fredericksburg & Wilderness Telephone Co., Chancellor, Va., or call A. R. Pemberton, Jr., Chancellor, Va., HU 9-2400 or ST 6-2681.

A. E. Switchboard, recently removed from service, 440 C. B. lamp ended, lines equipt. 40 Mag. drops, 30 cord circuits, divided ringing, 2 position (non-mult) board comp. with 3 amp. rectichargerand 24 V. batteries, M. D. F. equip. with prot. for 450 lines. Any reasonable offer takes. Contact Don Woodard, Mutual Telephone Office, Harlan, Iowa.

LINE TRUCK: Near new condition. Original Cost $7,350.00. 2-ton Chevrolet complete with Baker Body, Garwood Winch and Derrick, Power Reel, Pole Trailer, Construction tools and many extras. All new in 1954. Used one year, in storage since. Asking $3,350.00, other offers considered. See at 7790 Granby St., Norfolk, Va., or write Edward Kinosky, 200 Navaho Road, Richmond 25, Va.

KELLOGG SWITCHBOARD AVAILABLE NOV. 3, 1957. See this one first. In service now at Jefferson, Iowa. Excellent condition.

COMPLETE:

- Decimonic-Automatic Ringing — 3 Appearances
- 4 Universal Positions 17 Cord ckts each
- 2 Secret Service Positions 19 Cord ckts each
- 1200 C.B. Local Lines (Capacity 1600)
- 40 Pay Station Lines
- 40 C.B. Rural 24 Volt (Reversing Jacks) Lines
- 20 C.B. Rural 48 Volt (Reversing Jacks) Lines
- 30 R.D. Toll Lamp ended.
- 12 ckts Transfer Service
- 3 Loop Dial Trks
- 3 Position Dials & Cords
- 10 Inter Position Trunks
- 1 32 Line Fire Grouping ckt

Msc. Equipment

- 24 Cells #24DF 7 Batteries (good as new)
- 2 Lorain #V300 D Chargers
- 1 North #1104 Chargers
- 2400 C. Pr. MDF
- 1300 Pr. Protection (500 Cook #100)
- 1 Standby Pole Changer (Decimonic)
- 1 Test Desk
- 1 Power Bd.

Also available now 1000 Decimonic, handset, Kollcord phones. All good as new, blank for dial. 900, 925, 9817, 648, etc. All individually boxed.

For information, contact
C. H. DAUBENDIEK, Tel. #662
Box #267, Jefferson, Iowa

What You Want
When You Want It
Immediate Shipment from
Nearest Warehouse Points

TELEPHONE & POWER SUPPLY, INC.
TOPEKA, KANSAS PHONE 4-8788

IN STOCK!

Stromberg-Carlson #1248-W (desk); #1258-W (wall) Magneto Telephones. Can also be converted easily for Common Battery or Dial Service. RECONDITIONED with NEW Cords & GUARANTEED . . . $19.50 Each

A.E. Type 40 Desk Handset Monophone, Completely Self-Contained with SL Ringer, NEW 3 Conductor Neoprene Cords. Fully RECONDITIONED.

DIAL BLANKED . . $13.00 Each
With A.E. #24A36 Dial . . . . . $17.50 Each

Western Electric #302-AW Desk Handset Telephone, Completely Self-Contained with SL Ringer, F-1 Handset, 101-A Induction Coil, BIAL Ringer, Condenser. Fully Reconditioned with NEW Cords.

DIAL BLANKED . . $13.00 Each
WITH W.E. DIAL . $17.50 Each

Stromberg-Carlson #1243 Desk Handset Telephone, Complete and Self-Contained with SL or Synchromonic Ringers, NEW Cords and Fully RECONDITIONED.

DIAL BLANKED . . $13.00 Each
WITH DIAL . . . . . $17.50 Each

QUANTITY DISCOUNTS AVAILABLE!!

TERMS: 1% 10 Days, Net 30; FOB New York

DELIVERY: Promptly From Stock

•

All Telephones Are Fully Reconditioned and Guaranteed

•

TELE-WIRE SUPPLY CO., INC.

146 Front Street, New York 5, N. Y.

CALL HAnover 2-9690

XUM

FOR YOUR DESK AT WORK OR HOME

Ideal for gifts, prizes

Bantam colored telephone, weighted, with top quality ball point pen trimmed in gold. Telephones in ivory, beige, yellow, red, green, blue, brown, gray. Pens in ivory, black, red, pink. Only $3.25 ea. postpaid. Send check or money order to W. H. Parker, 2741 Ridgeview Dr., San Diego 5, Calif.

RECONDITIONED LEICH #901 MAGNETO COMPACT WALL OR DESK SETS. 1600 ohm with strong generator for long rural lines.

Units like new and only several years old. Can be converted to C.B. or dial operation.

PRICE $22.50 EACH
12 to 24—$22.00 EA.
24 to 50—$21.50 EA.

BOHNSACK EQUIPMENT CO.
GERMANTOWN, NEW YORK

ROBERT E. FOLEY CONSTRUCTION CORP.

DESIGN—SURVEYS—APPRAISALS—Construction and Maintenance of Overhead and Underground Telephone Plant. Complete supply of poles available for emergency requirements.

48 GRISWOLD STREET
BINGHAMTON, N. Y. TEL. 2-7218

TELEPHONE PRINTING

By People Who Know the Telephone Business
SEE THE SUTTLE CATALOG

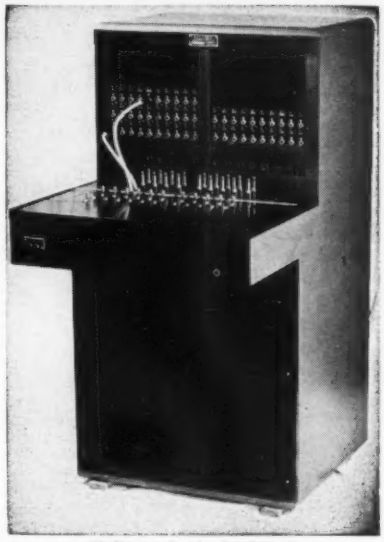
SUTTLE EQUIPMENT CO.
LAWRENCEVILLE ILLINOIS

FOR ALL OF YOUR CENTRAL OFFICE AND PBX INSTALLATIONS, MODIFICATIONS, AND ENLARGEMENTS, IT'S THE

T. E. I.
TELEPHONE ELECTRONICS INSTALLATION CORP.
Hayes Bldg., 12 E. Tenth St., Erie, Pa.
CAN WE BE OF SERVICE TO YOU?

Complete outside telephone plant builders. From frame to the phone

MULLEN CONSTRUCTION COMPANY
2002 E. Wisconsin Ave. REgent 4-9881
Appleton, Wisconsin



Kellogg (actual photo)

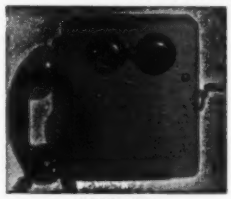
MAGNETO EQUIPMENT

Kellogg & Stromberg Carlson

←*(photo to left)*

New 100 line—50 equipped with combined drops & jacks, wired to 15' 51 pr. braid cable stub—Night alarm ckt. (no code alarm) 10 cord circuits (single supervised) with repeating coils. Standard-low type, 30" cord-shelf (desk height) built for Navy—never used—Hardwood (birch or maple) cabinet, painted green.

Clean as a whistle—tested—
fully guaranteed $295
Prints on request.
PBX Boards, W.E., Kellogg, S.C.



5812 MX

Brand New $12.50 each in std. package of 8 Kellogg #5812 MX

5 bar, 1600 ohm, anti-sidetone circuit. Complete with F27 handset, coiled cord. Oak cabinet, painted dull green. New and perfect—original factory pack. (2500 or 1000 ohm ringer $1.50 extra.)

Less than 8, each $13.50

Shipped on approval — we pay two-way freight if you are not entirely satisfied.

The Telectric Co.

1218 VENICE BOULEVARD LOS ANGELES 6, CALIFORNIA
Richmond 8-2249

UNITED UTILITIES, INCORPORATED

50th Consecutive Dividend

The Board of Directors declared a quarterly dividend of 30 cents per share on the outstanding common capital stock of the company, payable on or before September 30, 1957, to stockholders of record at the close of business August 28, 1957.

Abilene, Kans.
August 8, 1957

ALDEN L. HART,
President

SPECIAL OFFER

Aerial, Duct and Exchange Area Cable—REA Approved Ankoseal 775-P and Equal

LOW PRICES
QUANTITY DISCOUNTS

24 Gauge —
11 Pair thru 303 Pair

22 Gauge —
11 Pair thru 202 Pair

19 Gauge —
11 Pair thru 202 Pair

Self-Supporting Jacketed Cable—PSS; 6 Pair, 19 Gauge

•

COMPLETE STOCK OF LENGTHS AVAILABLE FROM 100 Feet up to FULL LENGTH REELS!!!

TERMS: 1% 10 Days, Net 30; FOB DESTINATION!

•

TELE-WIRE SUPPLY CO., INC.
146 Front Street, New York 5, N. Y.
CALL HAnover 2-9690

Stewart

TEST EQUIPMENT

Locates Trouble FAST

1000 Cycle TRANSISTOR OSCILLATOR

Model J

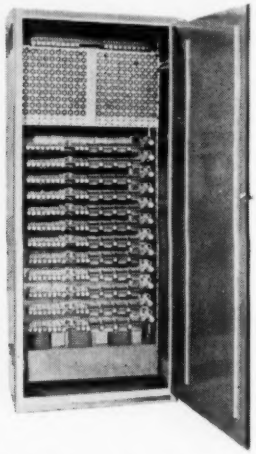
A Stable power source, for locating trouble in carrier systems and audio equipment.

Self contained mercury battery with operating life over 700 hours.

Pocket size, 2¼"x3"x4", Wt. 10.3 Oz.

STEWART BROTHERS
Division of Instrument Laboratories
Chicago 10, Illinois

NEW
COMPUTER INTERCEPT



New equipment for placing any TPL or TPS number or combination on intercept by the patch-cord arrangement within Computer field. Easy to install. Standard relays.

ASK FOR COMPUTER INTERCEPT BULLETIN

Universal Also manufactures Digit Absorbers and Code-to-Selective Ringing Converters.

UNIVERSAL
CONTROLS CORPORATION
P. O. BOX 13122 • DALLAS 20, TEXAS

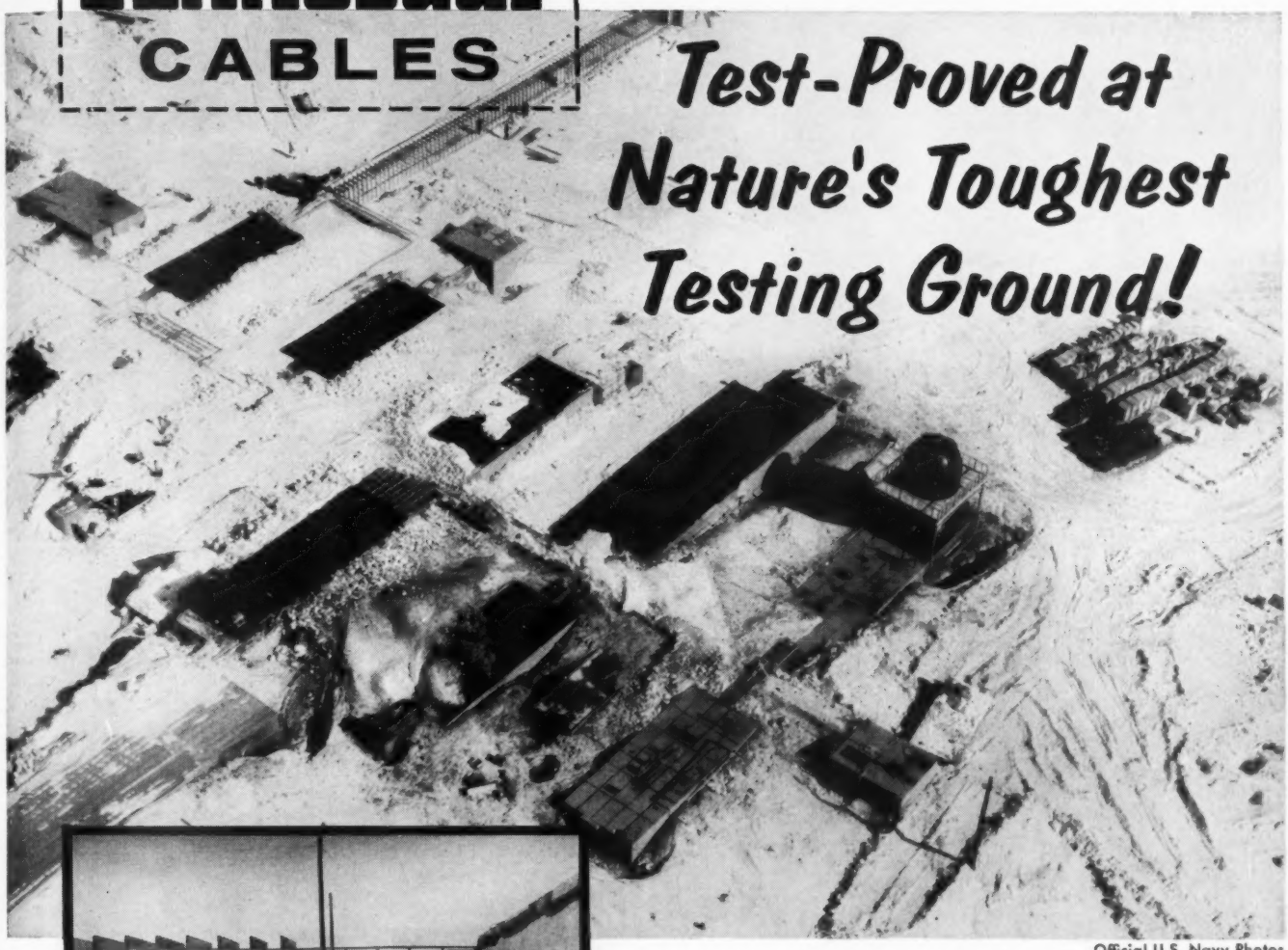
Index to ADVERTISERS

	Page
Acme Visible Records, Inc.	—
Alphaduct Wire & Cable Co., The	52
Aluminum Company of America	—
American Appraisal Company, The	—
American Chain & Cable Co., Inc. Wright Hoist Division	55
American Creosoting Corporation	—
American Electrical Heater Co.	—
American Steel & Wire Co.	—
American Telephone & Telegraph Co.	—
Amplifier Corporation of America	54
Anaconda Wire & Cable Co.	—
Ansonia Wire & Cable Co., The	63
Armstrong Cork Co., Glass Insulators	—
Atlantic Creosoting Co., The	58
Automatic Electric Sales Co.	8, 32-33, 49
Bakelite Company	—
Baker Wood Preserving Co.	—
Bashlin Company, W. M.	—
Bell Telephone Laboratories, Inc.	47
Benner-Nawman, Inc.	—
Berry & Co., L. M.	—
Bethlehem Steel Co.	—
Biddle Co., James G.	—
Bishop Manufacturing Corp.	—
Blaw-Knox Company	37
Bohnsack Equipment Co.	61
British Insulated Callenders' Cables, Ltd.	—
Buckeye Telephone & Supply Co.	59
Burgess Manning Company	—
Burroughs Corp.	—
C&D Batteries, Inc.	—
Cabaniss-Pogue Co.	58
Cable Breather Corp.	—
Cable Spinning Equipment Co.	—
Calculagraph Company	—
Chance Co., A. B.	—
Chase Brass & Copper Co.	55
Cleveland Inst. of Radio Electronics	29
Coffing Hoist Div.	—
Colorado Fuel & Iron Co., The	—
Commercial Cord and Supply Co.	—
Comptometer Corporation	—
Conroe Creosoting Co.	58
Cook Electric Company	—
Copperweld Steel Co.	—
Crane, Inc., Carl C.	58
Cullom & Ghertner	—
Davis Construction Co.	—
Donnelley & Sons, R. R.	55
Dow Chemical Co., The	—
Du Pont de Nemours & Co., E. I.	—
Duo-Safety Ladder Corp.	—
Eastman Chemical Products, Inc.	—
Edmund Scientific Company	—
Electric Specialty Co.	—
Electronic Secretary Industries, Inc.	—
Everstick Anchor Co.	—
Exide Industrial Division— The Electric Storage Battery Co.	41
Fitchburg Engineering Corporation	—
Foley Constr. Co., Robert E.	61
Free-Lock Corporation	—
General Cable Corporation	—
General Insulated Wire Works, Inc.	—
General Machine Products Co., Inc.	—
General Telephone Corporation	14
General Telephone Directory Co.	64
Gorman Rupp Company	—
Gould-National Batteries, Inc.	—
Graybar Electric Co.	—
Greenlee Tool Co.	50
Haley & Co., R. G.	56
Harris-McBurney Company	58
Henkels & McCoy	58
Highway Trailer Company	—
Hirsch Organization, Inc., Gustav	—
Holan Corp., J. H.	—
Homelite Corp.	—
Hubbard & Company	—
Indiana Steel & Wire Co.	53
Industrol Corporation	—
Ingram-Richardson Mfg. Co.	—
International Business Machines Corp.	—
International Harvester Co.	—
Irwin Auger Bit Co.	—
Johns-Manville	—
Katolight Corp.	—
Kearney Co., Jas. P.	—
Kellogg Switchboard & Supply Co.	6-7
Kennecott Wire & Cable Co.	55
Killoren Company	58
Klein & Sons, Mathias	54
Koiled Kords, Inc.	—
Koppers Co., Inc.	—
Leich Sales Corporation	12-13
Lindsay Telephone Supply Co.	57
Line Equipment Sales	—
Lorain Products Corp., The	—
Magnolia Chemical Company, Inc.	—
McFarland Company, L. D.	58
McGrath Engineering, Inc.	58
Morrison-Pelsue Co.	—
Mullen Construction Co.	61
Murphy Engineering Laboratories	57
Natco Corporation	—
National Pole & Treating Div.	—
National Standard Company	—
National Telephone Supply Co.	—
Neubauer Manufacturing Co.	46
Neuses, Inc., P. K.	—
North Electric Company	10-11
Onan & Sons, D. W.	—
Orangeburg Manufacturing Co., Inc.	—
Osmose Wood Preserving Co.	—
Owens-Illinois	15
Page & Hill, Inc.	—
Phelps Dodge Copper Products Corp.	—
Philco Corp. Gov't & Industrial Div.	—
Philco TechRep. Division	59
Porcelain Products, Inc.	—
Porter, Inc., H. K.	—
Preformed Line Products Co.	16
Prewitt & Sons, Inc., J. R.	—
Radio Engineering Products Limited	—
Raytheon Mfg. Co.	—
Recordak Corp.	—
Reliable Electric Corp.	9
Remington Rand Div.	—
Rex Corporation, The	—
Reynolds Metals Company	—
Roebling's Sons Corp., John A.	—
Rolatape, Inc.	—
Runzel Cord & Wire Co.	44
S&G Manufacturing Corp.	56
Schauer Mfg. Co.	—
Sequoia Process Corp.	—
Sierra Electronic Corp.	—
Sloan, Cook & Lowe Co.	58
Soapstone Duct Co.	—
Stainless, Inc.	48
Stanley-Yankee Tools, Inc. a subsidiary of The Stanley Works	—
Stewart Bros.	62
Stewart-Warner Corp., Electronics Div.	—
Stromberg-Carlson Co.	2-3, 30, 42, 43, 61
Superior Cable Corporation	5
Suttle Equipment Co.	61
Taylor-Colquitt Co., The	45
Telectric Co., The	61
T.E.I. Corp.	61
Tele-Muff Co.	54
Telephone & Power Supply Co.	60
Teletype Corp.	—
Tele-Wire Supply Co., Inc.	60, 61
Telkor, Inc.	—
Templeton, Kenly & Co.	—
Thornhill Publishing Co.	—
Truck Equipment Co.	—
Tudor & Yager, Inc.	58
U. S. Cable Constructors, Inc.	—
United States Independent Telephone Association	—
United States Instrument Corp.	51
United States Steel Corp. American Steel & Wire Co.	—
Universal Controls Corp.	62
Utica Drop Forge & Tool Div.	—
Utility Body Co.	—
Utility Tool & Body Co.	—
Warren Manufacturing Co., Inc.	—
Weikel Line Company	58
Western Electric Co.	—
Wheelock Signals, Inc.	—
White Motor Company, The	—
Whitney-Blake Co.	—
Williams Inspection Co., Inc., A. W.	58
Wiremold Co., The	—
Wright Hoist Div. American Chain & Cable Co., Inc.	55
Yates Construction Co.	58
York-Hoover Corporation	—

XUM

ANSONIA®

Ankoseal CABLES



Test-Proved at Nature's Toughest Testing Ground!

Official U.S. Navy Photos

In Antarctica, reliable communications are vital to the success of Operation Deepfreeze. The lives of men and the safety of equipment *demand* accurate transmission of information and instructions.

Ankoseal Rural Distribution Wire was specified for telephone, intercom and control circuits because it is simple to install, easy to maintain, and adaptable to emergency service. Indoors at Little America V, this versatile wire is strung from rafters in snow covered tunnels and buildings . . . outdoors it is strung on poles and sometimes it is simply laid on the snow. Under all conditions this Ansonia wire has passed every rigorous test!

Ansonia Ankoseal Cables are engineered to meet your most exacting requirements. They are built up to a standard, not down to a price. Whenever you require *dependability* . . . specify *Ansonia Ankoseal Cables.*

Aerial and Direct Burial Cables

Self Supporting Cables

Inside Wiring Cables

B.U.G. Cables

Parallel Line Wire

Rural Distribution Wire

THE ANSONIA WIRE & CABLE COMPANY, ASHTON, R. I.

ANSONIA®

Ankoseal

The Oldest Name In Plastic Cables In The Most Modern Plant Devoted Entirely To Producing Plastic Cables.

up a tree?

Increased costs edging you out on a limb? Maybe we can help. Records show that our Complete Directory Service Plan is operating successfully for independent telephone companies in 4400 communities. We handle everything. Turn out good looking directories . . . with fewer headaches, more income.

Like to know how? We'll be happy to show you. Just call or write our nearest office.

GENERAL SYSTEM

GENERAL TELEPHONE DIRECTORY COMPANY

1800 Busse Highway • DES PLAINES, ILLINOIS • VAnderbilt 4-2164

Divisional Sales Offices

COLUMBIA, Mo. • 811 Cherry Street • Gibson 2-6907
DURHAM, N. C. • 108 E. Parrish Street • Tel: 5133
ERIE, Penna. • G. Daniel Baldwin Building • Tel: 2-4187
FORT WAYNE 2, Ind. • 229 E. Berry Street • Eastbrook 3477
LEXINGTON, Kentucky • 157 Walnut Street • Tel: 4-7626
LONG BEACH 15, Calif. • 1775 Ximeno Ave. • HEmlock 3-7441
MADISON, Wisconsin • Tenney Building • ALpine 7-1667
SAN ANGELO, Texas • 110 South Taylor St. • Tel: 6738
SPOKANE, Wash. • 108 N. Washington St. • MAdison 4-4336
SPRINGFIELD, Ill. • Myers Bros. Building • Tel: 8-3425

SEP 4
XUM